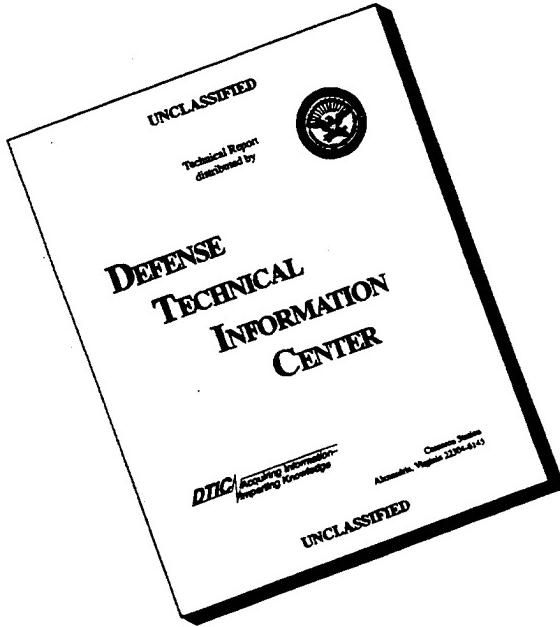


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# SECDEF ANNOUNCES SINGLE PROCESS INITIATIVE

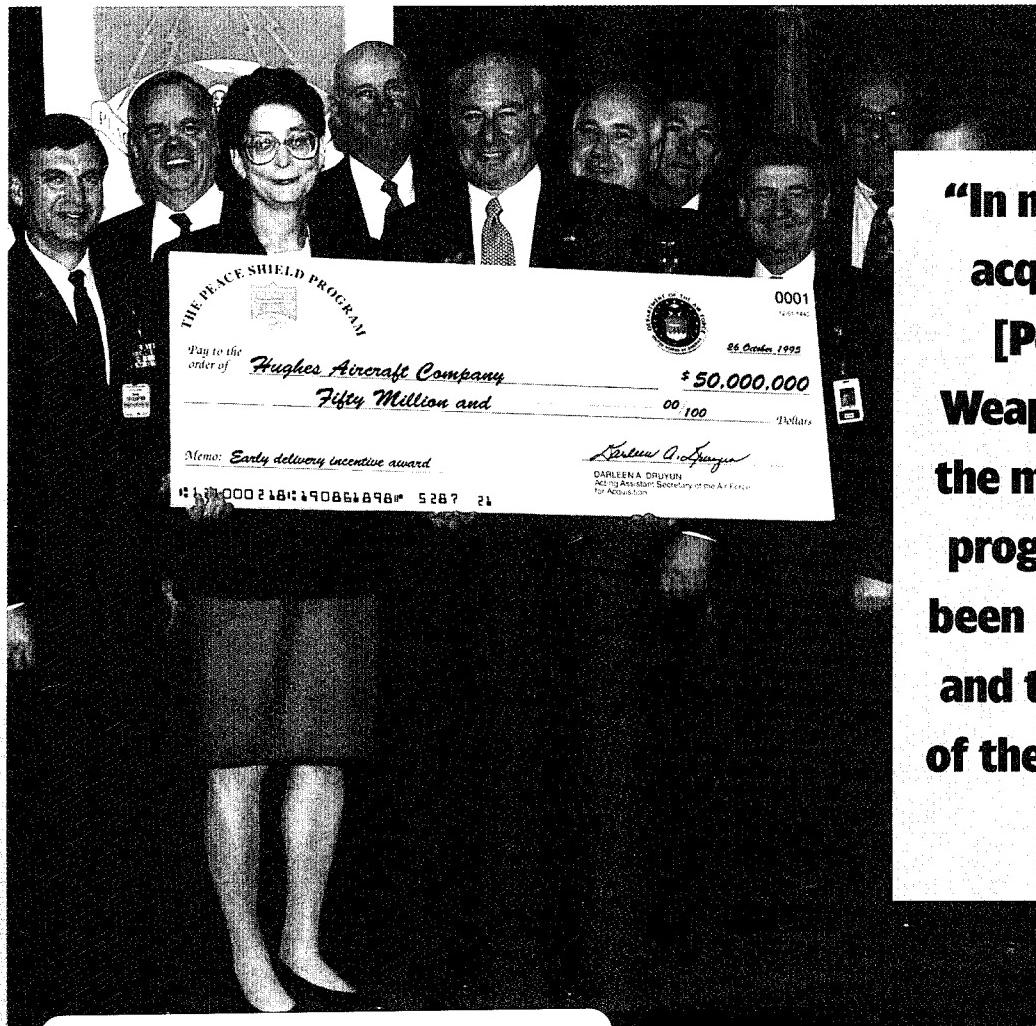
March-April 1996

# PROGRAM MANAGER

Performance-based Management

ISO 9000 Series

New Attack Submarine



**"In my 26 years in acquisition, this [Peace Shield Weapon System] is the most successful program I've ever been involved with, and the leadership of the U.S. Air Force agrees."**

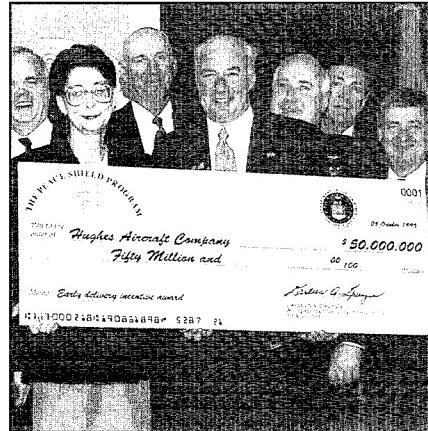
Darleen Druyan  
Air Force Service  
Acquisition Executive

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# PROGRAM MANAGER

Vol XXV, No. 2, DSMC 131



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Collie J. Johnson

Secretary Perry, Dr. Kaminski announce the Single Process Initiative — DoD's effort to accelerate bringing common processes to contractor facilities.

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## Performance-based Management — The Devil is Truly in the Details

James H. Gill

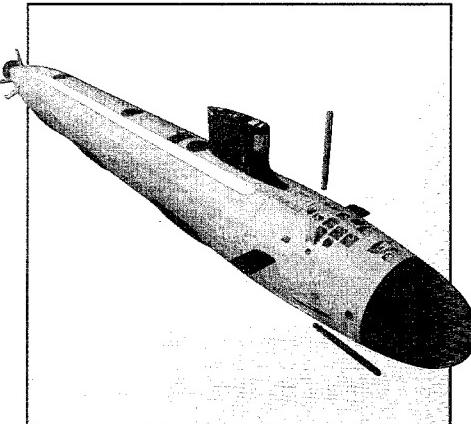
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B.A. "Tony" Kausil IV

Hughes Aircraft uses a strong monetary incentive to achieve extraordinary program success.



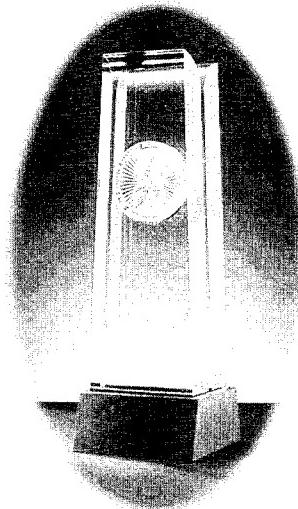
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## NSSN — New Attack Submarine

Lt James R. Barney, USN

Rear Adm. John J. Zerr, USN

U.S. Navy's "Paper Submarine" undergoes an exhaustive Early Operational Assessment.

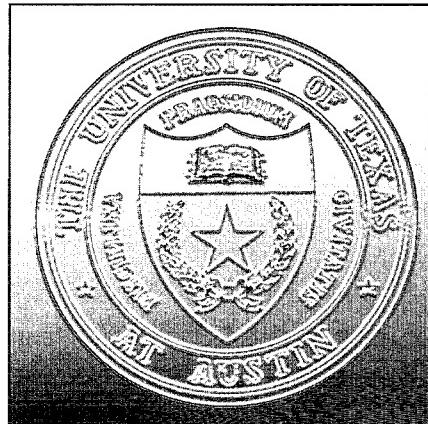


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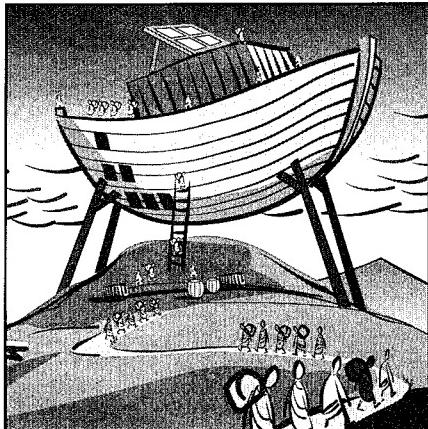
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Collie J. Johnson

Science and Technology Commercialization graduate degree now offered at DSMC's Fort Belvoir campus.

# SYSTEMS MANAGEMENT COLLEGE

Cover: Former Acting Secretary of the Air Force for Acquisition, Darleen Druyun, presents Hughes Aircraft representatives a \$50 million Incentive Award for early delivery of the Peace Shield Weapon System.

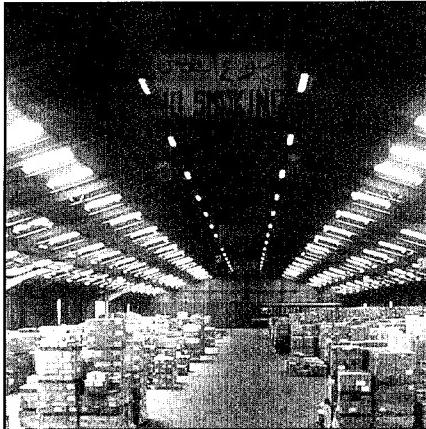


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Harvey L. Burnsteel

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SECRETARY PERRY ANNOUNCES THE

# Single Process Initiative



THE SECRETARY OF DEFENSE  
WASHINGTON, DC 20301-1000

6 DEC 1995

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS  
CHAIRMAN OF THE JOINT CHIEFS OF STAFF  
UNDER SECRETARY OF DEFENSE (ACQUISITION AND  
TECHNOLOGY)  
ASSISTANT SECRETARY OF DEFENSE (COMPTROLLER)  
CONTROL, COMMUNICATIONS AND INTELLIGENCE)  
GENERAL COUNSEL  
INSPECTOR GENERAL  
DIRECTOR OF OPERATIONAL TEST AND EVALUATION  
DIRECTORS OF DEFENSE AGENCIES

SUBJECT: Common Systems/ISO-9000/Expedited Block Changes

My June 29, 1994 memorandum on Specifications and Standards directed the use of performance specifications to the maximum extent practicable, and the development of a streamlined procurement process to modify existing contracts to encourage contractors to propose non-government specifications and industry-wide practices that meet the intent of military specifications and manufacturing requirements. Although much progress is being made in applying these government-unique management and manufacturing requirements, that government-unique management and manufacturing standards which impose principles on new contracts, this progress has itself shown prevent us from realizing the full benefits of these changes by requiring, in a single facility, multiple management and manufacturing systems designed to accomplish the same purpose. Because it is generally not efficient to operate multiple, government-unique management and manufacturing systems within a given facility, there is an urgent need to shift to a facility-wide common systems on existing contracts as well.

In order to meet our military, economic and policy objectives in the future, and to expedite the transition to this new way of doing business, the direction given in my June 29, 1994, memorandum is hereby revised. In addition to the direction given there for government-unique specifications and standards, I now direct that block changes to the management and manufacturing requirements of existing contracts be made on a facility-wide basis, to unify management and manufacturing requirements within a facility, wherever such changes are technically acceptable to the government. The single point of contact for this effort will be the Administrative Contracting Officer (ACO) assigned to a facility.

U44045 :95

# TO CONTRACTOR FACILITIES

The Under Secretary of Defense for Acquisition and Technology shall issue additional guidance necessary to facilitate the Department's streamlined review of contractor's proposals to replace government-unique management and manufacturing requirements in existing contracts with uniform requirements within the contractor's facilities.

We cannot afford to allow "business as usual" to delay this initiative. I therefore request that you and your leadership take an active role in expediting the transition of existing contracts and reprocurements to common systems.

*William J. Perry*



# B R I N G I N G A C O M M O N P R O C E S S E S

DR. KAMINSKI'S FOLLOW-UP MEMO TO SECRETARY PERRY'S

## Single Process Initiative



ACQUISITION AND  
TECHNOLOGY

THE UNDER SECRETARY OF DEFENSE  
3010 DEFENSE PENTAGON  
WASHINGTON, DC 20301-1000



DEC 8 1995

MEMORANDUM FOR SECRETARIES OF THE MILITARY DEPARTMENTS  
CHAIRMAN OF THE JOINT CHIEFS OF STAFF  
UNDER SECRETARY OF DEFENSE (COMPTROLLER)  
ASSISTANT SECRETARY OF DEFENSE (COMMAND,  
CONTROL, COMMUNICATIONS AND INTELLIGENCE)  
GENERAL COUNSEL  
INSPECTOR GENERAL  
DIRECTOR OF OPERATIONAL TEST AND EVALUATION  
DIRECTORS OF DEFENSE AGENCIES

SUBJECT: Single Process Initiative

Secretary Perry's memorandum of December 6, 1995 requested that I promulgate guidance for making block changes to existing contracts to unify the management and manufacturing requirements of those contracts on a facility-wide basis, wherever such changes are technically acceptable to the government. Secretary Perry further directed that the single point of contact for this effort will be the Administrative Contracting Officer (ACO) assigned to a facility. Accordingly, I am providing the following additional guidance on these issues.

Replacement of multiple government-unique management and manufacturing systems with common, facility-wide systems should, in the long run, reduce the costs to both our contractors and the DoD. Contractors will, however, in most cases incur transition costs that equal or exceed savings in the near term. We expect that cases where this does not hold true are in the minority, mostly dealing with high value, long-term contracts. Accordingly, I direct use of an expedited, streamlined approach to ensure that the contractors' proposals of block changes are technically acceptable and to quickly identify those cases where there may be a significant decrease in the cost of performance of existing contracts.

ACOs are directed to encourage contractors to prepare and submit concept papers (see the attached TAB A) describing practices that will permit uniform, efficient facility-wide management practices. Contractor recommendations included in the concept paper should be accompanied by a cost-benefit analysis adequate to determine the rough order of magnitude of the costs and benefits to the contractor of the proposed system changes (including any impact on the cost of performance of existing contracts). This cost benefit analysis shall be performed without requesting certified cost or pricing data. The detail included in these concept papers/cost analyses is intended to be just sufficient to allow an informed,



# TO CONTRACTOR FACILITIES

rapid judgement by the ACO on whether proposed changes to management and manufacturing processes can be approved on a no-cost, block change basis, applying guidance in this letter.

Where such a proposal is technically acceptable and there are no significant net savings in the cost of performing existing contracts, the ACO, after appropriate consultation with program managers, shall issue class modifications to those contracts without seeking an equitable adjustment. In those cases where the contractor's proposal will result in significant decreases in the overall net cost of performance of existing contracts, the contractor should be asked to submit a formal proposal for an equitable adjustment (consideration) and to submit separate, detailed cost data in support of the proposed amount. The negotiation of equitable adjustments should not delay the modification of contracts.

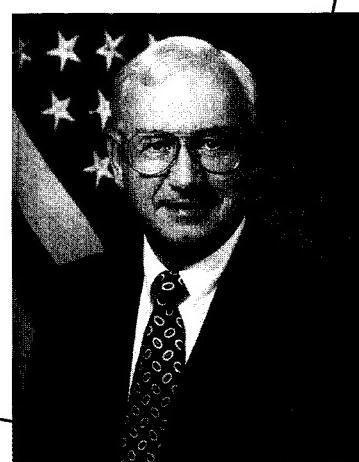
Note that the specific shift from MIL-Q-9858A to ISO-9000 does not in itself result in significant contractor savings in most contracts, and hence can be made on an expedited basis.

I also direct that, effective immediately, ACOs have the authority to execute class modifications, subject to receipt of necessary programmatic authorization from affected components.

The Commander, Defense Contract Management Command (DCMC) shall approve all requests for certified cost or pricing data in connection with this initiative unless such data are required by law. He will also be the focal point for implementing these efforts within DoD, and will facilitate the coordination of the change process. Tab A depicts the block change process detailing underlying assumptions, roles, and responsibilities.

The Commander, DCMC should prepare for me and for the Component Acquisition Executives a brief quarterly report that describes the progress achieved in replacing multiple government-unique management and manufacturing requirements in existing contracts with more efficient, common facility-wide practices.

*Paul J. Kaminski  
Paul G. Kaminski*



# DoD Press Briefing Underscores Important Acquisition Reform Initiative

## Secretary Perry, Dr. Kaminski Address the Acceleration of Bringing Common Processes to Contractor Facilities

COLLIE J. JOHNSON

**A**cquisition reform again surfaced as one of the Pentagon's top priorities during a December 8, 1995 DoD Press Briefing. Secretary of Defense William J. Perry, flanked by Under Secretary of Defense for Acquisition and Technology, Dr. Paul G. Kaminski, announced a new policy designed to implement a single process initiative that, as designed, will ultimately lead to the use of common processes and performance specifications on existing DoD contracts. The initiative comes as good news for Defense and industry as both downsize and seek innovative ways to produce and procure the most cost-effective, technologically superior weapons for the modern warfighter.

### Real Acquisition Reform

Referring to the Federal Acquisition Streamlining Act (FASA) of 1994 as an integral legislative vehicle for acquisition reform, Perry commented:

When I came to the Pentagon in 1993, one of my most important initiatives was to achieve real acquisition reform...The real objective of acquisition reform is to allow the Defense Department to buy products (weapon systems), not only at lower cost, but also to get higher-quality products because we have access to the most modern technology.

Perry then affirmed his confidence that this objective could be achieved

because, "We had the support of the President, the Vice President, and strong support in Congress. And we knew it was important because we needed a savings in acquisition in order to rebuild the modernization program."

Addressing the issues of cost savings and cost avoidance, Perry said that we also need better access to commercial industry because we cannot afford the cost of a separate defense industrial sector nor the missed opportunities of the technological advances being made every week throughout the commercial defense industry. He expressed his confidence that the successes DoD has experienced to date in acquisition reform will continue on into the future.

### DoD Specifications and Standards Reform

Perry believes that his DoD Specifications and Standards Reform memorandum of June 1994 was a major step forward in acquisition reform. By mandating the use of performance specifications and standards, we encourage innovative contract management. He stated, however, that because that direction affected only new contracts, the DoD recognized the need for an initiative that addresses existing contracts, where we [DoD] can realize near-term savings that can affect acquisition programs in the immediate future. "Our principal acquisition reform initiatives in this area thus far

were focused on new contracts. This single process initiative is significant in that it impacts existing contracts."

### Defining the Need

Currently in many contractor facilities several different processes or specifications may be used for similar manufacturing or management operations due to differing requirements in various contracts. This approach is inefficient, leading to increased cost and administrative workload for both the contractor and the government. Over the last year, several initiatives moved toward changing this situation. Participating in these efforts were the non-Government Standards Integrated Process Team, sponsored by the Joint Logistics Commanders and the Common Process Facility Working Group, co-chaired by OSD's Director, Test, Systems, Engineering and Evaluation; and the Commander, Defense Contract Management Command. In August of this year, members of these organizations and the OSD staff, principally the Office of the Deputy Under Secretary of Defense for Acquisition Reform, began working together to draft the single process initiative policy.

Referring to the inefficiencies resulting from dissimilar manufacturing or management operations, Perry emphasized that we must learn to "piggyback off of what is being done on the commercial side and consolidate the processes that are used by the Defense Department."

With this initiative, and starting now, Perry stated that DoD will seek to reduce the number of processes used. "However," he cautioned, "in real life, reducing the processes is more complicated because the contractor may have a Navy contract for one type of plane, an Air Force contract for another type, and an Army contract for a missile."

Herein lies the compromise, according to Perry — to seek to modify the contracts as a block, not simply contract by contract, modifying all contracts at once in a given facility, to consolidate the number of processes, thus eliminating all but one. (The figure depicts an overview of this Block Change Process.) He is optimistic this can be done on a streamlined basis, and cautions that the longer it takes, the longer we will continue to incur the cost of duplicate and unnecessary processes, specifications, and standards.

Wrapping up his presentation, Perry summarized the changes that will be effective with the issuance of the new single process initiative:

- We will be able to consolidate processes on existing contracts.
- We will attempt to modify the contracts as a block, not contract by contract.
- We will do this on a streamlined basis in order to get the savings as soon as possible.

## How Do We Proceed?

Introducing Dr. Paul G. Kaminski, Under Secretary of Defense for Acquisition and Technology, Perry turned the briefing over to Kaminski who proceeded to outline the "nuts and bolts" of how we [the professional acquisition workforce] can expect to change our way of doing business as a result of the single process initiative.

Reiterating Perry's assertion that implementation of the single process initiative policy requires a streamlined approach, Kaminski emphasized that we can and will "get it done quickly so

**Our goal is to consolidate or eliminate multiple management or multiple manufacturing processes when they're not needed. These multiple manufacturing processes add unnecessary cost to the goods and the services that are purchased by the Department.**

we can begin to benefit from the associated savings and cost avoidances sooner rather than later."

### Basic Objectives

"This morning I signed a memo,<sup>1</sup>" stated Kaminski, "promulgating implementation guidance to proceed with this program with the idea of achieving four basic objectives in the process:

- Quick implementation, for the reasons stated above.
- Obtain consideration when there are one-sided savings in the process. That is, when we make a modification to a contract that results in savings to be accrued to the contractor, and it's a fixed-price contract over a long period of time, we want to ensure the government benefits in the savings; we want to go back into those situations and seek consideration.
- Minimize the cost of implementation. We could go through a very

cumbersome procedure to implement this change in those cases where we see that the savings will be dual-sided. That is, the government will benefit, for example, in a cost contract where the cost avoidance taken by the contractor will be passed on directly to us. We see no need for a cumbersome process that would add expense or delay in implementation.

- We want to protect the interests of the principal stakeholders in this process — the individual program managers who may be affected, and the individual program teams who are operating in a given facility."

Referring to the Integrated Product Team approach, Kaminski stated that we will be using the approach to make a block change for modifying the specifications and standards for all existing contracts on a facility-wide basis, rather than on a contract-by-contract basis. The real issue here, according to Kaminski, is that it's not feasible to make a contract-by-contract change for a facility that has many contracts; that we must try to go through a set of common processes across the whole facility.

"Our goal is to consolidate or eliminate multiple management or multiple manufacturing processes when they're not needed. These multiple manufacturing processes add unnecessary cost to the goods and the services that are purchased by the Department."

### Added Requirements Cost Big

To illustrate the cost of added contract requirements and associated costs, Kaminski cited specific examples. Referring to a Coopers & Lybrand study, commissioned by the DoD about a year back,<sup>2</sup> he cited examples of added costs of requirements associated/imposed by the DoD on our major contractors — costs above what would be imposed by normal commercial practice.

The Coopers & Lybrand study looked, for example, at one military standard

# BLOCK CHANGE PROCESS

The block change process depicted in the figure designates DCMC as the lead facilitator to implement plant-wide changes. The process is built on existing structures within the components and OSD and is designed to create a sense of urgency in the approval process for streamlining of specifications, standards, or other processes.

## Proposal Development

Industry is encouraged to prepare and submit concept papers for streamlining specifications and standards with emphasis on early customer involvement and interface. Once the cost and benefit of the change has been determined through this early involvement, industry shall submit block change proposals. A definitive concept paper is also acceptable. As a minimum, the proposals should detail the proposed processes and associated metrics, rough order of magnitude cost benefit analysis, the consequent changes in government's involvement in the process, and required regulatory/contractual changes.

## Approval

Following submittal of the proposal, the Contract Administration Office (CAO) shall determine the contractual/regulatory scope of change, confirm the component customer base impacted and, if required, organize a local management council based on the nature of the proposal. The management council should be comprised of senior-level representatives from the local CAO, the cognizant Defense Contract Audit Agency (DCAA) office, the contractor, and subject matter experts representing the key customers within the affected components.

Notionally, the key customer base shall be comprised of customers

who represent 80 percent of the total dollar value of affected contracts.

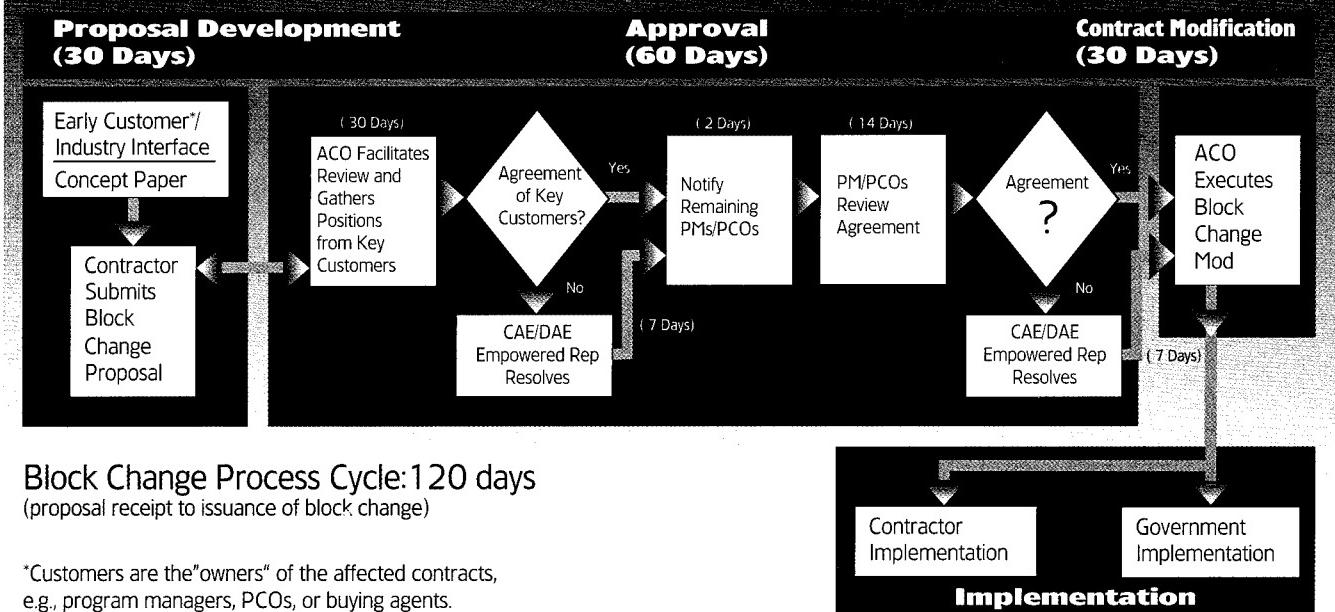
## Roles and Responsibilities

The role of the management council is to analyze the merits and cost benefits of the change. Empowerment of subject matter experts from the key customer base is critical. To minimize delay, a component team leader should be designated and granted decision authority by the CAE to represent the key customer base. Component team leaders are responsible for achieving consensus with other component team leaders, the key customer Procuring Contracting Officers (PCO) and PMs, the component team members, and the CAE. The CAO should be responsible for facilitating and leading the management council. The ACO will have the contractual authority to execute all block changes. The figure shows the decision process along with timelines expected of this streamlined process.

## Internal Government Resolution Process

The objective of this process is to resolve disagreements, facilitate consensus, quickly elevate and resolve issues of substantial concern, and reemphasize the overall goal and objective. If there is disagreement between PM or other customers within a component, the issue must be raised to a level within the service as designated by the CAE. If there is disagreement among the components, the issue must be raised to a level within the Department as designated by the DAE. Once resolved, the ACO executes the change.

## Block Change Process Overview



\*Customers are the "owners" of the affected contracts, e.g., program managers, PCOs, or buying agents.

– MILQ 9858A (a particular quality standard used by the DoD), and found that the contribution of that standard caused a cost premium of doing business with the DoD of about 1.7 percent of the cost of items purchased by the Department in the facilities that they serviced. "When looking at the overall costs of a procurement budget of over \$40 billion per year," he noted, "that's a pretty significant number."

Coopers & Lybrand also looked at materiel management and accounting systems imposed by the government, and found this too to be a major contributor to cost, adding about six-tenths of a percent to the Department's cost. In one facility, for example, Coopers & Lybrand found that the government was requiring the same parts to be stocked in 15 different locations, because of multiple contracts, each with their own requirements. This obviously drove up the stockage levels of parts required, added to obsolescence and deterioration problems; and created the kind of inefficiencies we want to avoid.

Another example of what's broken that we're trying to fix, according to Kaminski, is in the area of soldering specifications. One contractor facility is required to use eight different soldering specifications - five for the government and three for commercial purposes. (These specifications are for similar types of products.) This means personnel doing the soldering and those inspecting it must be trained on all the different techniques involved. Production documentation also differs for the different processes. Empathizing with the contractor's difficulties in managing such a confusing array of specifications, Kaminski stated that, "It's very difficult to streamline a manufacturing process across a facility in this environment. If we can consolidate to one or two major specifications, manufacturing personnel can become more proficient, the inspection requirements and the paperwork can be reduced, and we can, where possible, leverage off the commercial process."

### A Period of Transition

Kaminski cautioned his audience that there is going to be a period of transition – this might be a year, maybe a year-and-a-half – in which there will be costs of transitioning to a new process base. "We don't know enough today to predict whether in the short term, there's going to be a net savings or a small cost. Whatever is going to happen in the short term is going to be small...there will be some costs during the transition period." Kaminski believes, however, that savings will eventually accrue to the contractor, who will avoid cost of multiple manufacturing processes, and for most contracts we have in place, there will be bilateral savings. The savings will be passed directly to the government and in the end to the taxpayer.

According to Kaminski, he sees that happening with cost reimbursable contracts in those situations where we have options that have been priced; where we can go back and readdress those options. In the case of longer-term, fixed-price contracts, with the possibility of unilateral savings (savings to the contractor but not to the government because of the fixed-price structure based upon our cost analysis), we will look at making adjustments to those contract prices in that unilateral case.

Kaminski stated that the focal point for this activity will be the administrative contracting officer assigned to the Defense Contract Management Command (DCMC), which is located in the contractor's facility. They will follow a process that will include the streamlined review and the adoption of contractor's proposals to proceed with this initiative across the whole facility. This doesn't mean, according to Kaminski, that the customers – the program managers and the buying activities – won't be involved. Our local DCMC activities will use management councils to include the involved program managers and other customers as well as our Defense Contract Audit Agency to review contractor proposals related to elimination or

consolidation of these requirements. Only when there is agreement on the extent of the change will the administrative contracting officer execute the block changes to the contracts for that facility.

"We intend for this to be a streamlined approach," he commented. "We will not spend months having detailed cost proposals prepared, audited, and negotiated unless the initial review by an administrative contracting officer indicates that the possibility exists of substantial, unilateral savings after the contractor transition costs and the government administrative costs are considered.

Kaminski expects the number of these unilateral savings cases to be minimal, and does not want to unnecessarily overburden the system with them.

### In Conclusion

Summarizing his remarks, Kaminski stressed the need for direct and immediate action on the single process initiative. "The longer it takes us to implement this, the longer we will bear the cost of inefficiency on these separate processes. In my opinion, we want to move very quickly to get on with it to see if we can't begin to reach closure in our projected year to a year-and-a-half time frame.

**Editor's Note:** Kaminski concluded his remarks with a brief question-and-answer session. The questions and his responses appear on pp. 10-11.

### END NOTES

1. The memorandum Kaminski is referring to appears on pp. 4-5 preceding this article.
2. Kaminski is referring to a study conducted by Coopers & Lybrand for the Department about one year ago to determine what the added costs of requirements, either associated or imposed by the DoD on our major contractors, cost the taxpayer over and above what would be imposed by normal commercial practices.

# And Now for the Tough Questions...

## Dr. Kaminski Meets the Press

**Editor's Note:** At the end of the December 8, 1995 DoD Press Briefing at the Pentagon announcing the Single Process Initiative, Dr. Paul G. Kaminski, Under Secretary of Defense (Acquisition and Technology), concluded his remarks with a candid question-and-answer session that focused largely on cost savings and cost avoidance. The questions and his responses appear below in their entirety.

**Q**

*Do you have any idea how much the initiative will save over a year or two?*

**A**

I don't have a precise number, but I can give you some feel for the savings we're looking at. If you took as just an indicative figure the Coopers & Lybrand study,<sup>1</sup> they had indicated that the cost of unique military quality requirements was something like 1.7 percent. I don't think we'll get all of that back because there are going to be some remaining, unique quality requirements. But even if you used a number like a percent, the annual savings will be measured in the hundreds of millions of dollars. And the way I expect to see that come about is in terms of cost avoidance that will show up in the pricing of all the contracts downstream. I don't expect us to try to run some kind of an audit system here that requires pricing in the old way with the old processes, and pricing in the new way so we can account precisely, year by year in the future, what the savings will be.

**Q**

*Where will the big savings come from – in esoteric things like computer chips and vacuum cleaners, or in big-ticket items like aircraft?*

**A**

I believe they'll come in big-ticket items as well. I think what we're talking about here is something measured

in the hundreds of millions of dollars per year as we get over that crossover period. And the important thing here is that, unlike many of the acquisition reform initiatives that we're undertaking, this one affects all current programs. Much of what we've done thus far, we've implemented for new starts, for new activities. This cuts across the board with everything in the Department. That's why the potential is so large.

**Q**

*Do you have a feel for how many of these [percentage of total contracts] will be unilateral?*

**A**

I do not. But I do not believe it's going to be a very large number. I think it will be a very small number, but I cannot provide you an exact percentage today.

**Q**

*Do you have a feel for how long it's going to take?*

**A**

Our expectation is to be through this basic process in something around a year, maybe somewhat longer.

**Q**

*During the Gulf War, America's technological prowess was very much on display. For this deployment to Bosnia, are there going to be any new technologies or things that we have acquired during this*

*Administration's tenure that we'll see over in Bosnia that we've not seen before?*

**A**

There will be some new technologies. I think perhaps the things that will make the biggest difference have to do with what we're doing in "system of systems" – pulling things together to have a much more effective intelligence system to support tactical kinds of operations.

**Q**

*As an example?*

**A**

We're doing some substantial work right now to improve the integration of the various elements in our forward base intelligence analysis and processing and dissemination systems. I can't give you a one-word program example. Really, the right description is "system of systems"; that is, seeing individual systems that operate in the field today. For example, the U2 reconnaissance system and the tactical UAV system – the ability to put together the information derived from the various systems; to fuse that information together to gain a sensible picture of what's happening – the situational awareness – and distribute it to the right people; we are making dramatic improvement in doing that, and doing that in a very timely way – something being done in minutes and hours as opposed to a process in the past which might take 24 hours. That's where I think we'll see the biggest impact.

**Q**

*What will happen with the savings from the single process initiative – are they going back to the individual Services?*

**A**

The place where the savings are going to show up is in cost avoidance. So the programs as we execute them will cost less in the future than they will today, and the way that will be taken account of, as I indicated after about a year or perhaps slightly more into this process, each of our individual program managers and the Services, as they prepare their POMs next year, will begin to be able to make forecasts for these savings. I gave you some indication of what I called the “tops down” view; that is, taking a big, gross number like the Coopers & Lybrand study to give you an indication for the kind of size of potential cost avoidance that’s here. We’ve also looked now from the “bottoms up.” We have begun to do some work in some facilities to look to do cost avoidance. But here in individual facilities, we’re seeing the potential for savings in the tens of millions of dollars per year. Those are going to be picked up as we go through our annual budgeting cycles in terms of voiding the costs that we have been incurring today.

**Q**

*What drove this difference between the two – the separation that’s developed between the military side and civilian products? Was it a passion for secrecy, or the idea that civilian stuff wasn’t good enough for the military?*

**A**

I think it has many roots. But one of the strong roots is that 20 years ago as electronics were being developed, the reliability of electronics just wasn’t up to snuff as to what was needed for military applications. What’s really happened here is that the reliability of commercial electronics has gone up dramatically through the years, so that in many cases we can simply buy off commercial lines, and the processes are adequate. That was not the case 20

or 25 years ago, and was what forced us to set up some of our own requirements.

**Q**

*Have there been any companies or program offices that have been selected to initiate this process, or Beta sites?*

**A**

We have in effect Beta sites. I have with me today one of our PEOs, George Williams. He is one of the accounts that I refer to who is responsible for having done a major piece of work at one of the Raytheon manufacturing facilities showing us the potential from the bottoms up.

**Q**

*Any others that you could cite?*

**A**

Texas Instruments has done one; Boeing is another – we’ve got several reinvention sites who will be giving us the base for the bottoms up.

**Q**

*Would this program be applied to the Hunter program, for example, which is about ready to transition from low-rate production, to full-scale production. That would be a program, which I believe right now is undergoing contract negotiation, so would this program be applied in that specific program?*

**A**

I expect this to be applied to every program. But I think that’s the wrong way to think about it. You have to think about this being applied to a facility, and then being applied to all the programs that are produced in that facility.

**Q**

*TRW programs also?*

**A**

Part of Hunter is produced and integrated in a TRW facility; part of it is produced in an Israeli facility.

**Q**

*Would this be applied in Israel as well?*

**A**

That is something that in principle, yes, we have the base to do that. But our principal thrust is going to be here in the United States.

**Q**

*Speaking of the Hunter program, you canceled or delayed the Hunter DAB scheduled for last Monday. When can we expect a decision on the program?*

**A**

I think our next decision on the Hunter program is going to come down to a budgetary decision, which is in the process of being discussed as we put together our 97 budget. We haven’t made it yet.

**Q**

*Have there been guidelines developed on identifying adequate consideration where you anticipate modification of contracts where the savings will be unilateral?*

**A**

We have developed guidelines for beginning to go about the process in terms of identifying the kind of pricing data that will be required for the process. But what we have tried to do is streamline this process to allow the ACO to exercise some fair judgment as to whether the unilateral savings is likely to be significant or not. If the judgment is that it’s not likely to be significant, we will keep this process simple and streamlined. If the judgment is that the unilateral savings is likely to be significant, then we really have to go into full swing to obtain the detailed proposals to get pricing and audit data, and go back and do that in a very quality way.

#### ENDNOTE

Dr. Kaminski is referring to a study conducted by Coopers & Lybrand for the Department about one year ago to determine what the added costs of requirements, either associated or imposed by the DoD on our major contractors, cost the taxpayer over and above what would be imposed by normal commercial practices.

# Increasing Program Management Effectiveness Through Single Process Facilities

## Simple In Concept, Complex In Implementation, But Potentially Extremely Productive

JOHN A. BURT

In June of 1994, the DoD took a major step toward implementing real reform by mandating the use of performance specifications and standards and, where not appropriate, the use of commercial specifications and standards. But those changes — as important as they were — effectively applied to new contracts only. The DoD has now taken the next major step toward reforming the department's purchasing practices in approving guidance implementing a "single process initiative" to reduce the number of government-imposed processes on existing contracts. As with many good ideas, it is simple in concept, complex in its implementation, yet extremely productive when properly engaged.

### The Impetus — Why Do We Need Change?

Institutionalizing single process facilities and encouraging their rapid introduction is a job that I believe program managers (PM) will welcome because their rewards are great in two areas that PMs care about the most: cost and schedule! When coupled with the realities of a declining budget and the warfighter's constant need for affordable systems and equipment, it begins to take on an even larger presence. I will address the following three fundamental issues in this article:

- Why single process facilities are worth pursuing.

**Finding and exploiting innovative business practices is necessary if we are to achieve the objectives of acquisition reform. Business as usual is simply not supportable with today's budget constraints.**

- How single process facilities relate to other initiatives.
- What the PM or PM staff role should be in this regard.

### Is the Single Process Initiative Worth the Pursuit?

First, the need for pursuing the single process philosophy is centered on addressing the realities of today as we prepare for tomorrow. Finding and exploiting innovative business practices is necessary if we are to achieve the objectives of acquisition reform. Business as usual is simply not supportable with today's budget con-

straints. The dynamics of the defense industry are changing in response to unparalleled downsizing and restructuring within both government and industry. The dynamics of technical management have experienced dramatic change as well. Some leading-edge companies have shown ability to reduce both cycle time and cost by 30 to 50 percent, while significantly improving quality.

The DoD is making substantial progress in changing the way we do business — significantly reducing the size of Requests for Proposals (RFP), reducing the unnecessary imposition of military standards, and implementing Integrated Product and Process Development (IPPD). However, while our industry partners are responding to the new realities of defense acquisition, their efforts to dramatically improve processes have been limited. Dramatic improvement will require a reengineering of many of the core processes within our contractors' facilities.

Process reengineering has been understandably difficult, if not impossible, under the traditional way of doing business because of requirements in existing contracts, and the lack of a mechanism for the multiple customers using a facility to work together. Despite the efforts of individual PMs in a facility to streamline their RFPs to provide needed flexibility, it is difficult, if not impossible for contractors to

Burt is the Director, Test, Systems Engineering and Evaluation, Office of the Under Secretary of Defense (Acquisition and Technology).

make substantial plant-wide changes to their processes unless other customers in their facility take similar actions to provide the needed flexibility.

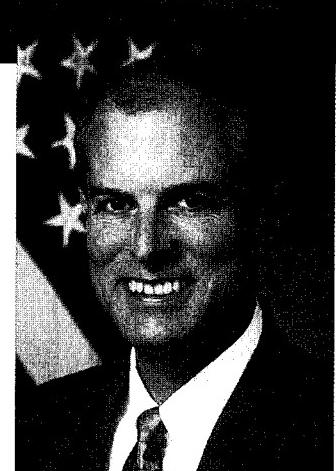
Providing flexibility and teamwork to focus on process improvement and the use of implementation of best practices are the real benefits of the single process facility approach. For industry this will promote long-term competitiveness. For DoD programs this will mean more efficient and effective industrial processes, facilitating our goals to acquire products and services better, faster, and at less cost.

The single process initiative provides opportunities for contractors to reengineer and standardize processes on a facility-wide basis where it makes good business sense. Technical as well as business processes are targets for potential improvement. The move to single processes in a facility does not preclude the flexibility to tailor process applications of the single process to individual programs in that facility. The true benefit will accrue from allowing contractor ownership of their processes, and in doing so, encouraging contractors to baseline and improve their processes by applying best practices.

## JOHN A. BURT

Director

*Test, Systems Engineering and Evaluation  
Office of the Secretary of Defense*



**M**r. John A. Burt is the Director, Test, Systems Engineering and Evaluation for the Department of Defense (DoD), responsible for policy and oversight of developmental test and evaluation. He is also responsible for oversight of all DoD test facilities and resources within the following parameters: over \$25 billion in replacement costs; over 50,000 people; over one-half of DoD land; and an annual budget of approximately \$6 billion. Burt chairs the Defense Test and Evaluation Steering Group and reports directly to the Principal Deputy and the Under Secretary of Defense for Acquisition and Technology.

Burt completed a distinguished 24-year career in the U.S. Navy in 1989. During his Navy career, he completed three tours in Southeast Asia and had numerous high-level assignments as he progressed up through the rank of Captain.

In 1989, Burt accepted a position at the Federal Aviation Administration (FAA) as Special Assistant to the Administrator. In 1990, he served as Executive Director for Acquisition. From 1991 until 1994, he held the position of FAA's Executive Director for System Development.

Burt earned his B.S. from the U.S. Naval Academy, an M.S. from the Naval Postgraduate School (Aeronautical Engineering), and is a graduate of the Defense Systems Management College.

His awards include the Legion of Merit, Meritorious Service Medal, Air Medals, and Navy Commendation Medals. He recently served as a Member of the Board of Directors of the International Test and Evaluation Association.

### RELATED TRENDS IN ACQUISITION REFORM

#### Key Areas

#### Requirements

#### Source Selection Criteria

#### Technical Approach

#### Contractor Processes

#### Quality

#### Design Trades

#### Government Oversight

#### Conventional View

"What" (system performance) and "How To" (specs & stds)

Reliance in specs/stds — process issues secondary

Serial design, development, and production

Dictated by specs/stds — major customers

Inspection intensive, accept rework

Cost dependent on performance — true costs of trade-offs obscure or unknown

Adversarial based on overseeing compliance — lacking trust

#### New View

"What" not "How To" — system performance balanced to life cycle cost

Reliance in system performance requirements — process issues and past performance significant

Integrated process using IPPD — collocated engineering — design for mfg., IPTs, advanced engineering, and mfg. practices

Dictated by best commercial practices and continuous improvement efforts

Quest for perfect first time, quality achieved through design and mfg. process effectiveness

CAD-CAM tools — modeling and simulation — using cost as an independent variable — cost included in design databases

Growing collaboration based on process insight/measures of process maturity and trust

## **But How Does It Fit With Other Acquisition Reform Initiatives?**

Second, it is important to understand how the single process initiative fits with other ongoing initiatives. The Defense Manufacturing Council recognized the need for improvement in the Department's technical management processes, and has taken positive actions to support and facilitate the implementation of a number of related acquisition reform practices:

- Use of System Performance Requirements
- Implementing Integrated Product and Process Development
- Developing Measures of Process Maturity
- Improving Risk Identification and Management
- Providing Requirements Flexibility and Using Cost as an Independent Variable
- Facilitating Single Process Facilities
- Integrating/Harmonizing of Related Service/Agency Initiatives

Some of the changes taking place related to these initiatives are shown in the Figure (bottom of preceding page). Synergy exists among all of these initiatives, and implementation of these initiatives in a coordinated fashion will facilitate industry making the major changes necessary to deliver products better, faster, and cheaper. Changes to processes may take the form of standardizing and/or reengineering their processes to eliminate unnecessary requirements, or apply improved practices, or a combination of the foregoing.

I am encouraged because a number of contractors have already started this process, and their results have been impressive. The long-term benefits to be gained are promising indeed and should include – among other benefits – improved competitiveness.

## **What Are the Roles of the PM and Staff?**

Lastly, the significance of your role as PM, or member of the program man-

agement team, can hardly be overstated. You are critical to these initiatives because of your role in developing requests for proposals and your technical (and management) responsibility for the process requirements levied through contract requirements. What we are experiencing in the area of technical and other related acquisition reform initiatives have presented program managers with many opportunities to help ensure the success of their programs.

## **Role of the Professional Acquisition Workforce**

Perry's memorandum of December 6, 1995, and Kaminski's memorandum of December 8, 1995, have led the way in defining a streamlined "block change" approach for the implementation. The cognizant Defense Contract Management Command contract administration office and the administrative contracting officer will facilitate the process of implementation. You, as a key customer, will play a pivotal role in providing your leadership in setting the tone and creating the environment for contractor single process efforts to succeed. You as a PM can influence the effective implementation of the single process facility initiative in a number of ways:

- Clearly articulate the importance of contractor process effectiveness on your program and encourage your contractor to make the shift to single processes – the sooner the better.
- Actively participate in local management councils overseeing the review of contract process change proposals.
- Ensure that negotiations stay on track, and do not get bogged down over "rice bowl" or inconsequential issues.
- Ensure that future RFPs are structured to facilitate contractor flexibility, and place appropriate emphasis on contractor process effectiveness.
- Make process maturity and measures of process effectiveness a key aspect of program management.

- Encourage flow down of single process flexibility to subcontractors and suppliers.
- Recognize the achievements of government and contractor personnel.

Another key area that will need focus in the approval process is the impact of contractor proposed changes in terms of cost, schedule, and product and process risk. Use of earned value management systems will provide the PM visibility, planning, and tracking discipline necessary to understand the potential impact to guide process improvement efforts. Your early engagement as part of the management council will expedite this analysis and do much to assure timely approval of concept papers.

## **Conclusions**

Streamlining the acquisition process is aggressively underway, and the single process facility initiative is critical to the PMs – hence the Department's – overall success. Previously, contractors working with the government have been inhibited from making major changes in many of their core processes because of "how to" requirements in existing contracts and similar, but different requirements of other customers in the same facility. The combination of these factors has hampered reengineering of contractor core processes.

Perry's December 6, 1995 memorandum indicates that "we cannot afford 'business as usual' to delay this initiative." The single process facility concept has enormous potential for facilitating acquisition reform implementation. When effectively implemented, it can provide contractors the impetus and flexibility to improve processes and establish a close government and industry working relationship oriented toward improving contractor and program effectiveness. This initiative will benefit all concerned from taxpayer to warfighter. The ultimate success is clearly dependent on the leadership of the PM and the program office staff. You are crucial to the success of this approach.

# The Commercial Power of Common Processes

## How Motorola Government Electronics Division Implemented a Successful Common Process Methodology

AMY KASSNER • DICK WHITE

**I**t all started with a commitment. Motorola's Government Electronics Division (GED) at Scottsdale, Arizona, in a concerted effort to improve its business processes and provide maximum product value to Motorola's customers, was one of the earliest businesses to implement an innovative new way of doing business — the single or common process methodology, identified throughout the DoD acquisition community as the single process initiative.

### About the Methodology

In today's business climate, continuous improvement of all business processes is a distinct competitive advantage for any business. Motorola is no exception. The single or common process methodology allows Motorola to enhance its efficiency by allowing similar tasks to be performed in the same manner, thereby reducing errors, and facilitating the identification of process weaknesses and subsequent corrective action. This is critical to continuous process improvement. Another added benefit is that process tailoring can be significantly reduced.

In addition, the workers who implement the process go through multiple learning cycles, resulting in lower processing costs, and increased process consistency and efficiency. Since tailoring a process to satisfy multiple customers can create chaos, the single or common process minimizes this dis-

**The "Reinvention Lab" concept, enables flexibility of approach, allows innovation, and encourages paradigm shifts.**

advantage and its associated problems. Once the single or common process is initiated in a business environment, continuous improvement in functional and product areas is also facilitated.

### The "Reinvention Lab"

The "Reinvention Lab" (a process used by the Government to develop new methods of doing business) concept, enables flexibility of approach, allows innovation, and encourages paradigm shifts. We were empowered to break out of traditional modes of doing business and develop and implement new and innovative approaches to increase value to our customers. This business

approach supports the "Single Quality System" concept or common process methodology.

Motorola has experienced success implementing the strategies and methodology of the Reinvention Lab. One early experience was the process characterization and optimization activities initiated in 1986. At that time we had numerous ways of doing even basic tasks such as coating and staking of electronic assemblies. Motorola initiated a process characterization and optimization initiative designed to achieve the single best method for improving the manufacturing process. We used four steps: process definition, analysis, process optimization, and process control. The results were a 10:1 reduction in the total number of specific manufacturing processes.

### National Security Agency, 1992

This concept was again used in 1992 when Motorola joined with the National Security Agency (NSA) to create a generic "Quality Program Plan." The generic Quality Program Plan allowed us to define the best process, in our estimation, and pursue this process with NSA personnel. A negotiation process followed, which assured that both parties' expectations were met in a manner that satisfied NSA requirements. The plan provided a single quality process methodology for executing both ground and space programs.

## **DCMAO-Phoenix, 1995**

In 1995, Motorola and the resident Government (DCMAO-Phoenix) joined forces to apply the single process methodology to the single quality system in response to acquisition streamlining objectives. Again, going to the "Single Quality System" at Motorola's Government Electronic Division started with a commitment. Both Government and Motorola leadership provided resources to accomplish this effort. The objectives were to:

- determine the Motorola quality system adherence to ISO 9001 for DoD contracts;
- develop an Advanced Quality Practices document;
- develop a methodology for focused oversight (risk model); and
- establish a common set of results-focused metrics that could be used jointly by DCMAO-Phoenix and Motorola.

Once the program gained commitment, the next step was building joint communication, teamwork, and trust. Joint training was initiated with a certified ISO instructor facilitating the ISO 9001 training. The result was a set of jointly developed assessor checklists. These checklists were used to evaluate the Motorola system to ISO 9001 requirements. To further enhance communications, terminology specific to each organization was shared and understood by all.

In order to gain the greatest benefit during the fast-paced seven-week effort, all tasks became team tasks. Assessments were performed by sub-teams, and all observations were shared on a daily basis with the entire team. Corrective actions were jointly determined and implemented. Changes to both the Motorola system and Government requirements were identified. The assessment was completed in three weeks with excellent results. Motorola was awarded a Certificate of Qualification to the requirements of ISO 9001 by Col. Tom Barnes, DCMAO-Phoenix Commander. This effort completed our first

**If a process is not used multiple times, it is impossible to identify process weaknesses, make changes to the process, and then assess the effectiveness of the changes.**

objective – determining ISO 9001 adherence for DoD contracts.

Once the assessment was complete, including the agreed-upon system modifications, a joint group of government and Motorola personnel developed a basic quality practices document. This document covers topics not included in ISO 9001 that are of concern in defense contracting. These topics included right of entry, government source inspection, and technical data packages. An Advanced Quality Practices document was also created that encourages continuous improvement techniques, concurrent engineering, empowered teams, etc. This completed a definition of a quality system that is applicable to all levels of defense contracting.

In parallel, an effort was initiated to develop risk models. One model focused on the 20 elements of ISO 9001, and the second model focused on the product development/project activity. These risk models address the inherent risk of the process or product from a somewhat subjective viewpoint, followed by an evaluation of the system strengths to determine if the risk is mitigated. Likert scales were used to improve the objectivity of the risk assessment process. Quantitative data are used, where practical, when

reviewing the design or manufacturing process. The result of the risk evaluation is plotted on a Johari window, which provides a graphical view of high-, medium- and low-risk areas. The government and Motorola can immediately determine where to deploy resources. Since the original risk model development, the concept has extended to Program and Supply Management risk models.

As a part of this task, key metrics were identified. The metrics used to assess the health of the ISO 9001 system were specific to each ISO element. The activity was extended to include process and product development metrics. The objective was to provide a set of quantitative measures that depict performance/system health at designated intervals. This common set of metrics is reviewed by the government and Motorola each month.

Having met our four stated objectives, Motorola and DCMAO-Phoenix successfully defined and implemented a single quality system methodology. This method is constantly being evaluated to ensure that identified objectives are attained. It has been necessary to adjust some of the metrics and add risk models as a part of the continuous improvement process.

## **Summary**

As the three examples show, we have seen just how powerful a Common Process with increased Cycles of Learning can be. If a process is not used multiple times, it is impossible to identify process weaknesses, make changes to the process, and then assess the effectiveness of the changes. Our defect rates are down, our contract submittal errors are less, and on-time delivery is approaching 100 percent. Looking to the future, the opportunity to use this methodology is wide open in areas such as Contract Management, Business Systems, Program Management as well as Engineering and Manufacturing. We will continue to use this method as a part of our Continuous Improvement Initiative.

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# Performance-based Management — The Devil is Truly in the Details

**An Initiative Loaded With Good Intentions, But  
Ultimately a Bad Idea. Here's Why...**

JAMES H. GILL

The Federal Acquisition Streamlining Act of 1994 (FASA) contains many worthwhile and beneficial changes to the federal acquisition system. One section contained in the Bill attempts to relate pay and promotion to performance (TITLE V – ACQUISITION MANAGEMENT, Subtitle A – Armed Services Acquisitions, SEC 5001 Performance-based Management 2220, Performance-based Management: Acquisition Programs). As with the road to hell, this initiative is paved with good intentions; however, *the devil is truly in the details*.

## Background

The language of the law states that within one year after the enactment of FASA, the Secretary of Defense will review the "incentives and personnel actions available to the Secretary of Defense for encouraging excellence in the management of defense acquisition programs and provide an enhanced system of incentives to facilitate the achievement of goals..."

It further goes on to state that pay should be related to the performance of personnel in such programs as they contribute to the achievement of cost, schedule, and performance goals established for acquisition programs of the DoD. Personnel evaluations and promotions should also be influenced by the success of the respective pro-



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grams and the contribution of government individuals toward that success.

This legislation may be the collective work of many truly bright staffers; however, the flaw in performance incentives has always been the relationship between government and contractor personnel working on major acquisition programs. While both groups are motivated toward the successful completion of a program's cost, schedule, and performance, there are markedly different agendas. A con-

tractor will be motivated toward profit maximization, while concurrently satisfying the customer with regard to schedule and performance. The government wants a quality product, on-schedule, for the minimum cost possible.

### **Inherent Incongruities/ Inconsistencies**

The differing agendas provide visibility into the inherent incongruity in tying the promotions and incentives for government employees to the success of a contractor in the performance of a contract. While program success is of critical importance to all members of the Integrated Product Team, accountability for success or failure should rest on the shoulders of the contractor portion of the team. To do otherwise is

the Integrated Product Teams? Where are the funds necessary to reward successful performance? How often are these performance incentives allocated to the affected members?

### **Performance Measurement and Incentivized Management**

One of the most crucial aspects of measuring performance is the confidence or fidelity associated with the metrics established to quantify success. Success-oriented schedules and optimistic contract targets will be replaced with contingency-laden milestones and "soft" targets. This will guarantee success both to the contractor and the government personnel whose incentives are driven by these baselines. This is most certainly not a formula for successful acquisition.

The government has an obligation to support both the customer in the field and the taxpayer who pays the bills. These are difficult responsibilities in the often adversarial relationship between government and contractor. When the process is established that effectively incorporates the government and contractor teams into one entity, the potential for abuse magnifies exponentially.

A second concern with this approach to performance incentivized management relates to the need for management discretion in the assignment of personnel. Those programs in trouble, which desperately need the resources of the most proficient personnel, will not be attractive inasmuch as their promotion potential and pay incentives are to be tied to the contractor, who has already demonstrated poor performance.

intrinsically foolish for a number of reasons.

Several inconsistencies reside in the language of the law. Who exactly will be covered by this requirement? Will it be senior program management, e.g., Program Executive Officers, Service Acquisition Executives? Or will it be filtered down to the working level, i.e., the Program Manager and members of

This initiative presumes that there is a stability of personnel that is just not reasonable in these times of downsizing. While it may be attractive to have a stable group of government team members on a program, this is unlikely to occur. Personnel are rotated, most especially military team members, and some people are assigned to work multiple programs. How are we



Just because the road to hell is paved with performance incentives doesn't mean that we need to take it. They are a bad idea, and should be removed from an otherwise good legislative Act.

## THE A-12 – WHAT HAPPENED?

The A-12 was to have been the Navy's replacement for the A-6 Intruder as its premier radar evading attack plane. The government awarded a fixed-price, full-scale engineering development contract to McDonnell Douglas Corporation and General Dynamics in 1988. On June 1, 1990, the contractor team advised the Navy of a significant slip in schedule and cost overrun. Performance was determined to be unsatisfactory by [then] Secretary of Defense Dick Cheney, and the program was canceled and the contract terminated for default. The resultant contractor claim is currently in litigation with a potential \$3 billion at risk.

While there are numerous issues associated with the case, one relevant aspect is the lack of appropriate management visibility into the performance of the contractor. In July 1990, the Secretary of the Navy ordered an administrative inquiry to determine the "facts and circumstances surrounding the variance between the current status of the A-12 Program and representations made to the Office of the Secretary of Defense on behalf of the Department regarding the program during the course of the Major Aircraft Review.<sup>1</sup>" The report was highly critical of both the process and the people involved in communicating cost, technical, and schedule problems associated with weapon system performance.

The claim<sup>2</sup> resulting from the termination decision is the largest in the history of the Department of Defense. The contractor's lack of success on the program (alleged by the Navy to be one year behind schedule and \$1 billion over ceiling price) was not elevated by the program manager to senior Department of Defense management in a timely manner. The report found in its conclusion that neither the program manager, "nor the similarly well-qualified and dedicated officers in his chain of supervision, met the needs of senior civilian leaders within the Department of Navy and Department of Defense for an accurate assessment of the program's status and risk." This obfuscation contributed to the delay in the program's cancellation, and most likely, substantially increased the cost to the American taxpayer. If this behavior occurred with no formal process in place to tie promotions and performance bonuses to program success, it is not unlikely that such a process could contribute to the possibility of similar situations in the future.

### END NOTES

1. The Beach Report, November 28, 1990, p. 4.
2. McDonnell Douglas Corp. v. U.S., ClsCt. No. 91-1204C, complaint filed 6/7/91.

to assess their performance vis-a-vis the program's performance?

Program data, especially in the early stages of a program's development, will often be the subject of varying degrees of interpretation. Who will make the objective assessment as to the program's performance? Will these program control personnel be subject to the same performance incentives as the other members of the IPT? What is to preclude the possibility of "cooking the books" on program data? Will not the government personnel be more susceptible to contractor interpretation of data? The A-12 scandal centered upon the failure of government personnel to provide senior management with the necessary visibility as to the contractor's failure to make expected progress. Will there not be more of these actions if we tie program performance to personnel incentives?

### Degree of Risk

Another issue with regard to performance incentives relates to the high-risk vs. low-risk program. If there is a possibility that the program will have technical impossibilities during the early phases of its development, won't this negatively impact the performance incentive? Will this discourage some quality personnel from participating on these programs? Also, what degree of choice will personnel have with regard to working on selected programs that may have significant built-in risk? Will there be a floating scale associated with the degree of risk, i.e., higher-risk programs would contain greater incentives for participation?

### The Need for a Healthy Dose of Realism

Given the reality that there has been a serious underfunding of major programs during the last 20 years, what is the likelihood that there will be a concerted effort on the part of the Services to inject a healthy dose of realism into program forecasts in the future? If there are questions concerning the reasonableness of the forecasting effort in the past, what degree of confidence should we have that there will be more

reasonable ones in the future? If promotions and incentives are tied to these forecasts, will this have a serious impact upon the morale of those individuals assigned to work these programs? Does the performance incentive relate to the program's performance, i.e., if individuals do a superlative job with regard to technical manuals, for instance, do their contributions to the overall program's performance result in incentives to them, even if the program itself is behind schedule and over cost?

The role of government personnel on acquisition programs is to do all they can to contribute to the success of their programs while concurrently ensuring that contractors fulfill their contractual responsibilities in the performance of the contract. In short, the planning and programming of a successful program is a reasonable basis for evaluating the performance of government personnel and their potential for future promotion. The actual performance by the contractor is not the responsibility of the government team and should not be reflected in their individual performance evaluations.

### **Arm's Length is Best**

Examples abound of government individuals associating their interests too closely with those of the contractor. Don't institutionalize this type of behavior through performance and promotion incentives. Government/contractor relationships are most effective with an arm's length between each other; let us continue this practice by avoiding the "bedding down" of government and contractor personnel in the incentive arena. Just because the road to hell is paved with performance incentives doesn't mean that we need to take it. They are a bad idea, and should be removed from an otherwise good legislative Act.

### **FASA and Performance-based Management**

Not only did they not remove the language that related to performance-based management, Congress was

apparently not satisfied with the implementation effort of the DoD with regard to the FASA requirement for performance-based management. The next round of acquisition reform may direct DoD to make a better effort at incorporating the principles of performance-based management into the system.

The Congress, after attempting to tie their own pay to the successful completion of balancing the budget and accomplishing deficit reduction, has seen the light and will ask DoD to demand pay for performance. The details in the case of congressional pay will be the matter of the how, not the what. For example, if they balance the budget on the backs of the poor and elderly, will the liberal Democrats consider this successful performance? Or, if they balance the budget at the expense of defense readiness, will conservative Republicans consider this "successful performance?"

The importance of how is truly critical to successful performance evaluation. It is not enough to say that a contractor overran or underran a contract. Without true analysis of the "why," the "what" is meaningless. It is possible that the effort should have been underrun by more, and the contractor was ultimately not that successful. Perhaps the technical complexity of the effort was of a magnitude that even in an overrun situation, the contractor did a truly outstanding job. In an age of easy, simple solutions, it is not acceptable to some to present the difficulties associated with a popular solution. Like apple pie, motherhood, and baseball, rewarding productivity and punishing failure is the American way.

Unfortunately, it requires judgment and expertise to evaluate whether a program has truly been "successful." The concept of tying pay and promotion to the "successful" performance of a contractor on a program may prove to be more complicated than is possible in the current military and civilian personnel systems. A noble end doesn't always justify the means.

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Many of you recently responded to a PM/ARQ Readership Survey. The responses are in, and we'll be sharing the results in our May/June issue of *Program Manager*. On behalf of the DSMC Press, many thanks for your continued readership and support.

—Collie Johnson  
Managing Editor

# Peace Shield — A Study in Motivation

## Hughes Aircraft Uses a Strong Monetary Incentive to Achieve Extraordinary Program Success

B. A. "TONY" KAUSAL IV

**E**ven before the sun rose, workers began to arrive. Lights were turned on and you could hear the hum of another workday starting. The Los Angeles commuter is noted for spending (wasting) hours going to and coming home from work. But one computer programmer, "Virgil," at the Hughes Aircraft Company's Command and Control Systems Division plant in Fullerton, California, was unwilling to waste valuable time commuting. He was motivated to deliver a product ahead of schedule even if it meant "camping out" at the plant during the workweek, which is exactly what he did! And the fruits of "Virgil's" labor? On June 20, 1995, Hughes Aircraft completed system-level testing in Saudi Arabia, signifying the completion of the system development process for the Peace Shield Weapon System.

### Peace Shield Was Different

What was unusual about this program? A recent study by the Defense Systems Management College at Fort Belvoir, Virginia, indicated that the average cost overrun for Engineering and Manufacturing Development of a major system was 45 percent, and the schedule overrun was 63 percent. Yet, Peace Shield was delivered six months, 13 days ahead of schedule and below cost. How did the Air Force motivate a contractor to buck that trend? How did Hughes Aircraft motivate "Virgil" and the other employees of their company to deliver a product ahead of schedule to a customer?

### It All Began With a Contractor Default

The story starts in July 1991 after the U.S. Air Force terminated for default another contractor for failure to deliver Peace Shield. Hughes Aircraft won the new competition to design and deliver the system. The estimated value of the contract was more than \$1 billion. Final delivery was scheduled for January 3, 1996.

The Peace Shield program, built for the Kingdom of Saudi Arabia, required delivery of a nationwide ground-air defense, and command, control, and communications system to the Royal Saudi Air Force. Key elements included 17 radars, a central command operations center, five sector command and operations centers, nationwide communications links, interfaces with all agencies having a role in national defense, and communications centers to contact and control civil and military aircraft. Because this system was critical to the defense of Saudi Arabia, timely delivery was mandatory.

### The Workforce

The Peace Shield program was managed by the Air Force Electronic Systems Center, Hanscom Air Force Base, Massachusetts, as a Foreign Military Sale (FMS). "The schedule requirements of 54 months to deliver a Peace Shield system were thought by many people to be impossible," said Colonel Gary Smith, the Air Force Peace Shield program manager. "There were some estimates as high as 116 months. They actually met 47 months. An amazing feat!"



### Hughes Takes the Strategic and Tactical Approach to Incentives

To motivate the contractor, the program office developed a cost and schedule incentive approach to deliver the system three months ahead of schedule and below targeted costs. The contract was a combination of Firm Fixed Price and Fixed Price Incentive Firm, with sharing ratios of

Kausal is the holder of the Air Force Chair, DSMC Executive Institute.

75/25 (below and above targets) and a ceiling of 125 percent. Furthermore, the contract contained a real carrot and stick — a \$50 million bonus to the company for a three-months-early delivery, and up to a \$50 million liquidated damages provision for late delivery. The government had provided the incentive. The company's problem was how to succeed on this difficult development task with significant software

intensity of the program made it critical and susceptible to individual motivation. Hughes made a decision to set aside a portion of the contract incentive for the individual project workers. Each employee received shares that grew in value as they and the company met interim milestones. Additionally, significant individual and team achievements were rewarded by grant-

workforce on what promised to be a very tough job. Peace Shield was a much larger program with many more personnel involved than the NATO effort. Successful delivery of the system to the Kingdom of Saudi Arabia in less than 51 months would require significant individual and corporate commitment.

### **Employee Incentive Pool**

Using the NATO contract as a model, the company's Peace Shield program managers proposed an approach to Hughes corporate executives that designated 20 percent of the incentive award to an employee incentive pool. Because of the crucial nature of this program, Hughes corporate management doubled the incentive pool to 40 percent — a total of \$20 million. The award program was structured on a pro rata basis. If an individual worked the entire time, they would be entitled to the full amount of the award. If they worked 50 percent of the time, then they could earn 50 percent of the award. A minimum of 1,000 hours was required for any award. An additional 4.5 percent of yearly salary could be earned by meeting nine interim milestones. What this meant to the average employee who worked full-time for the entire length of the program was a potential bonus of almost 75 percent of annual salary.

"You need both a strategic and tactical approach to incentives," said Chuck Sutherland, president

of Hughes Command and Control Systems business unit. The Peace Shield program managers had lain the groundwork for the overall programs but they now needed short-term intermediate incentives. During the life of the program, additional software and hardware work was added by an engineering change. The company, determined to succeed, actually took profit



SEVERAL INDUSTRY EXECUTIVES AND ACQUISITION PROFESSIONALS FROM THROUGHOUT THE DEPARTMENT OF DEFENSE PROFESSIONAL ACQUISITION WORKFORCE CONTRIBUTED TO THE SUCCESS OF THE PEACE SHIELD WEAPON SYSTEM PROGRAM. FROM LEFT: DON NEUMAN, MITRE CORPORATION; TERRI SYNDER, HUGHES AIRCRAFT; BOB KRAMP, HUGHES AIRCRAFT; BRIG. GEN. BERWYN REITER, USAF, AF PEO/C<sup>3</sup>; CHUCK SUTHERLAND, HUGHES AIRCRAFT; DARLEEN DRUYUN, FORMER USAF SAE; JOHN WEAVER, HUGHES AIRCRAFT; MIKE ARMSTRONG, HUGHES AIRCRAFT; COL. GARY SMITH, USAF, PROGRAM DIRECTOR, ESC/IS; WAYNE SHELTON, HUGHES AIRCRAFT; MIKE SMITH, HUGHES AIRCRAFT, LOU KURKIAN, HUGHES AIRCRAFT; COL. CHARLES SCAPEROTTO, USAF, SAF/IAS.

and system integration risks. The real question: How to motivate the project team members?

The idea for a successful motivation program structure at Hughes actually began in 1989 when the company received an add-on for a small North Atlantic Treaty Organization (NATO) contract, which the Air Force sweetened by including a \$2 million incen-

ing additional shares. Upon completion, the employee could redeem the shares for a portion of the company's bonus. Company officials believe that the early delivery, under cost, was a direct result of the incentive.

Because of this success, Hughes decided a similar incentive approach might be an excellent way to motivate their

from an early contract change to form a supplemental incentive pool for employees. The profit was broken down in two \$600 thousand bonus efforts that represented three percent of an employee's annual salary. These were tangible, short-term benefits.

"Early, achievable incentives are important to motivate personnel since many believed that it was not possible to earn the money – it was too far out in the future," said David Pope, who headed the software engineering team. All interim milestones were met, and it became apparent to management that the employees were more highly motivated when the incentive was nearer term. To encourage teamwork, the company also developed a third, smaller bonus arrangement ranging from \$200 to \$1,000, with a formal presentation to those groups of employees who performed significant efforts in accomplishing contract work.

### **Inevitably, Some Problems Did Surface**

What were some of the problems Hughes encountered? "It took one year to get through internal corporate processes. There were many doubters. Some executives felt that people already had salaries and did not need any further motivation," said Sutherland. There were also concerns about the impact of this effort on other programs. Would personnel want to leave current programs? Would personnel not want to leave the Peace Shield program? While all these were valid concerns, the company held fast to the belief that a strong, monetary incentive was the key to program success.

"Corporate commitment directly contributed to the success of this bonus program. This has been shown in word and deed," said Sutherland. For example, software development was on a critical path. In order to minimize schedule risk, Hughes front-loaded the program with 20 percent more manpower than a program of comparable size would have normally been staffed. "The company chose to rule in favor of

schedule over cost every time," said Sutherland.

Hughes also generated an extremely detailed plan to track progress on software development. Although these plans were costly to implement and maintain, their use was fundamental to the program's success in beating schedule. "Critical to success was the teaming environment," said Sutherland. Hughes relied heavily on the team concept, using it for both employee recognition and as a way to manage the project. Middle management positions were eliminated, and a less hierarchical approach was instituted. Now, previous middle managers were working as successful team leaders. They also formed Integrated Product Teams with the U.S. Air Force. "This teaming with the Air Force helped us to understand and resolve many of the difficulties during the development," said Pope.

Family life can suffer when an employee is spending a lot of time at work, particularly in "Virgil's" case since he was "camping out" at the plant during the week. "It was important that the family understand the importance of the work and the reason for the long hours," said Sutherland. In the middle of the project, Hughes Aircraft held an open house with displays, briefings, and refreshments for families in order to help the families understand the project and to make them feel as though they were a part of it. "Now the families could understand what dad or mom was doing," Pope added.

Still, virtually throughout the process there were "Doubting Thomas's." Several government "red teams" reviewed the program and concluded almost to the end of the program that Hughes was six months to two years behind schedule. But in the end, the results spoke for themselves – delivery six months and 13 days early.

### **Why Did This Program Succeed While Others Failed?**

"We [Hughes and the Air Force] beat our target cost baselines, and met our

stretch program delivery goals," said Smith. "What makes it even more of a success is that as we added Engineering Change Proposals to the program, we were able to incorporate most of them without changing the schedule. This really makes it a remarkable success." He continued, "We were also lucky since this was an FMS program, we did not have the typical funding instabilities that many other programs have. Notwithstanding this, I believe the contract incentives contributed significantly to achieving program success."

How do you motivate contractors and their employees? This is a key question in government acquisition. This case study provides an example of successful motivation of a contractor and its employees. Too often "automatic incentives," such as incentive fees, are placed on contract with little or no results. Why did this succeed when other incentives failed? The answer is multifaceted: recognition by the company of the need to succeed, corporate and employee commitment, interim awards, team approach, and team and individual awards.

The difficulty in taking a case study and repeating its success is that the events and factors are not always the same. But using the lessons learned from this case and others, coupled with an understanding of the factors that motivate your program's contractor, plus a partnership with that company, can go a long way toward the successful implementation of contract incentives.

So how did Hughes do? In the words of Mrs. Darleen Druyun, Acting Assistant Secretary of the Air Force for Acquisition, "In my 26 years in acquisition, this is the most successful program I've ever been involved with, and the leadership of the U.S. Air Force agrees."

And how did "Virgil" do? For the months of extra effort, he received his bonus – perhaps even enough to buy a new camper!

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# God, Noah, and the Ark Project

## An Early Application of Streamlined Management Techniques

LT. COL. JOHN R. LONDON III, USAF

**T**oday's acquisition managers can gain valuable knowledge from case histories of previous acquisition programs, and the Defense Systems Management College makes wide-spread use of such histories in its diverse curriculum. Although most case studies used by today's acquisition students date from the World War II era to the present, valuable lessons can sometimes be gleaned from earlier system acquisition efforts. In fact, the earliest system acquisition in recorded history offers some amazing insight into ancient system development techniques, and also provides a benchmark for maximized streamlined management.

### The Plan

The project to build the ark that would withstand the Noahian Deluge was a grand effort upon which the survival of all living species of land-based creatures depended. This article will draw comparisons between the very first major acquisition project and current acquisition practices, and highlight some lessons learned from this development and production effort of perhaps six millennia ago that can still be applicable in today's acquisition environment.

When Noah was 500 years old, the world was in dire straits. Chapter 6 of Genesis provides the Mission Area Assessment as defined by God, the Commander-in-Chief of the Universe (CINCUNIV). In Genesis it says, "And God looked upon the world and saw how degenerate, debased, and vicious



it was; for all humanity had corrupted their way upon the earth and lost their true direction." During this Pre-Milestone 0 phase of His acquisition effort, CINCUNIV recognized the condition of Man as a threat He must deal with, and devised

a plan to do so. To successfully execute this plan, however, would require that the faithful remnant of mankind, along with a remnant of all land-based creatures, be preserved from the awesome destruction that was to come.

*London is the Deputy Missile Defense Architect in the Ballistic Missile Defense Organization, Pentagon, Washington, D.C. He is a graduate of APMC 95-2, DSMC.*

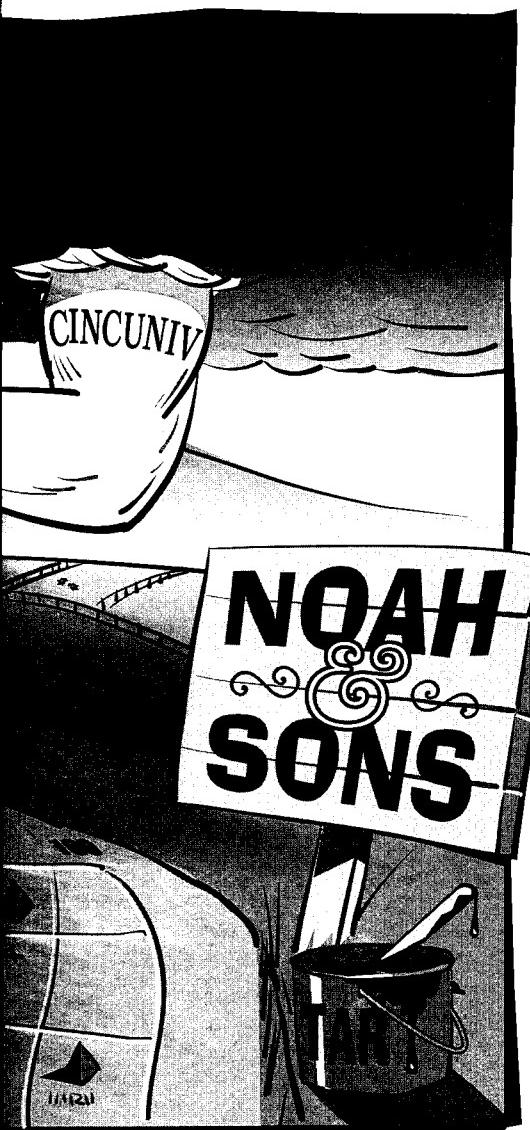
## Source Selection

To accomplish this task of preservation, CINCUNIV would need a highly specialized ocean-going vessel, which formed the basis of his Mission Need Statement. He turned to Noah, the one man on the earth who "found favor in the eyes of the Lord." His source selection criteria for his contractor is detailed in Genesis 7:1: "...for I have

tor; it says that when CINCUNIV specified the tasks to be performed, "Noah did this; he did all that God commanded him."

## Mission Needs Statement

In Genesis 6:13-14, CINCUNIV provides Noah His Mission Needs Statement: "...I intend to make an end of all flesh, for through men the land is filled with violence; and behold, I will destroy them and the land. Make yourself an ark..." Because of the absolute



seen you righteous before Me in this generation." Apparently CINCUNIV had great faith and confidence in His contractor, because Noah had no experience in a project of this nature or magnitude, and consequently there was no past performance information available. However, Genesis 6:22 indicates he was a very responsive contrac-

authority that CINCUNIV held, and because of the urgency of the requirement, the acquisition process represented the consummate model of streamlining. Of necessity, CINCUNIV took on the role of the Under Secretary of Defense (Acquisition and Technology), Component Acquisition Executive, Program Executive Officer, program manager, and chief designer all-in-one.

## Contract Award

After due consideration, CINCUNIV provided a sole-source contract to His contractor of choice, Noah & Sons, Incorporated, or N&S, Inc. He had to justify this sole-source decision only to Himself, and we can safely assume that this justification was extremely rapid and required no supporting documentation.

Simultaneous with His sole-source contractor selection, CINCUNIV provided the Operational Requirements Document (ORD), the detailed design specifications, incentive negotiation, and exit criteria all at the same time. He moved straight from Milestone O to Milestone III and a production decision, and waived all intermediate milestone decisions, all design reviews, and all test requirements. No Environmental Impact Statement was accomplished for the construction or the disposal site, although CINCUNIV apparently took into account the overall environmental impact of the coming flood.

## Contractor Requirements/Negotiations

As the next step, CINCUNIV combined His ORD with portions of the Statement of Work to provide requirements for His contractor: "For Behold, I will bring a flood of waters upon the earth, to destroy all flesh under the heavens...you shall come into the ark, you, and your sons, and your wife, and your sons' wives with you. And of every living thing of all flesh found on land, you shall bring two of every sort into the ark, to keep them alive with you..."

Never in history did a contractor have a greater performance incentive than what CINCUNIV provided to N&S, Inc., because the survival of mankind and all species of land-based creatures depended on their success. Contract negotiations were very straightforward, since the only alternative N&S, Inc., had other than to accept the contract was utter destruction.

## Exit Criteria/Testing

The exit criteria from Milestone III was very simple: the contractor must keep the occupants of the ark alive and well until the flood waters had receded sufficiently for reoccupation of the land. Because He was the source of the detailed design, CINCUNIV could easily waive all design reviews; N&S, Inc., would simply be required to build-to-print.

Testing would have to be waived by necessity, since the lack of a nearby body of water and the sheer size of the ark made testing impractical. Therefore, Developmental Test and Evaluation, Operational Test and Evaluation, Initial Operational Capability, and Full Operational Capability would have to take place simultaneously, and the system would absolutely have to work correctly the first time. Only one production unit would be built, so there were no opportunities for Low Rate Initial Production or learning curve development - N&S, Inc., would have to get it right on the first try, and failure was not an option.

## Design Requirements

The ark design requirements CINCUNIV provided to N&S, Inc., were specific: "make yourself an ark of cypress; make in it rooms, stalls, pens, coops, nests, cages, and compartments, and cover it inside and out with bitumen pitch. And this is the way you are to make it: the length of the ark shall be 300 cubits (450 feet), its breadth 50 cubits (75 feet), and its height 30 cubits (45 feet). You shall make a roof and a window — a place for light — to the ark, and finish it a cubit (at least 18 inches) above — and the door of the ark you shall put in the side of it; and you shall make it with lower, second, and third stories (decks)."

The window provided ventilation as well as light, and would become a critical asset when Noah sought to make assessments of the operational environment. Fortunately, CINCUNIV provided N&S, Inc., a great deal of design stability, since there is no indication of any design or requirements

changes once the baseline design was provided.

## A Lengthy Period of Performance

Although Phase I and II never formally occurred, because of the enormity of the project CINCUNIV allowed His contractor an exceptionally long period of performance during Phase III. Genesis indicates that from the time that CINCUNIV gave N&S, Inc., the original tasking until the time the ark was required to perform its mission was about 100 years. This is a remarkable testimony of patience and perseverance to both CINCUNIV and to N&S, Inc.

Although there are no indications of schedule slippage or cost overruns, 100 years is still a long time for any customer to wait to find out if the contractor is going to perform, especially when so much hung in the balance. And N&S, Inc., must have had to endure a great deal of ridicule from other contractors and the general public alike for spending 100 years building a ship the size of a cruiser on dry land for no apparent reason.

## Incentivizing the Contractor

Once the flood started, N&S, Inc., the contractor team, became N&S, Inc., the operator. By making the builders of the system its operators as well, CINCUNIV incentivized His contractor's performance in a way that no award fee or competition could ever do. The deluge lasted 40 days and nights, and it took a year and 10 days for the waters to recede sufficiently for the contractor team, their wives, and their cargo to disembark.

## Contract Completion

The ark came to rest on Mt. Ararat (in present day Turkey). Contract completion occurred after the ark was emptied, and CINCUNIV marked the occasion with the inaugural rainbow. System disposal apparently consisted of abandoning the vessel in place, and archaeologists continue to search for remains of the ark to this day.



**M**r. Clinton Osborne, Chief of Maintenance, Division of College Administration and Services since 9 August, 1987, retired with 24 years of federal service, effective January 3, 1996. "Ozzie" plans to continue residing in King George, Virginia, and pursue his hobbies of hunting, crabbing, boating, and motorcycling.

The ark project represents an example of streamlined management and system acquisition that will not likely be repeated. However, we can learn from this case study the benefits of unified and stable leadership throughout the acquisition process, tailored and streamlined contractual and documentation requirements, clear and stable design requirements, and a highly motivated and incentivized contractor team. Despite the lack of Total Quality Management, Integrated Product Teams, or Computer Aided Design/Computer Aided Manufacturing, N&S, Inc., delivered a product that performed to specifications.

What message does this ancient application of streamlined management techniques have for us today? The answer lies in one word — results. We must not lose sight of the fact that in the acquisition business, the name of the game is results, and the processes we develop to get us there should always be value added to the effort.

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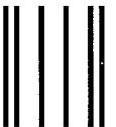


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# Common Processes and the Defense Contract Management Command

## Commander Speaks to DCMC's Pivotal Role in the Common Processes Initiative

MAJ. GEN. ROBERT W. DREWES, USAF

The adoption of common processes by contractors in lieu of multiple, unique DoD standards and specifications is one of the cornerstones of acquisition reform. Recent guidance from Dr. William J. Perry, Secretary of Defense, and Dr. Paul G. Kaminski, Under Secretary of Defense (Acquisition & Technology) underscored the importance of accelerating this shift toward facility-wide common processes. The Defense Contract Management Command (DCMC) plays a pivotal role in the initiative by encouraging contractors to submit common process proposals and expediting their review and approval.

### Background

Common processes are intended to help reduce contractor operating costs and benefit schedule and performance requirements. Unlike traditional contract-specific changes, common process changes will cut across all contracts at a particular facility. Although it is clear both the government and contractors can mutually benefit from the adoption of common processes, the review and approval of contractor process change proposals will require special technical and cost considerations. Critical to the success of this effort is coordination among the parties: the contractor, the DCMC, the

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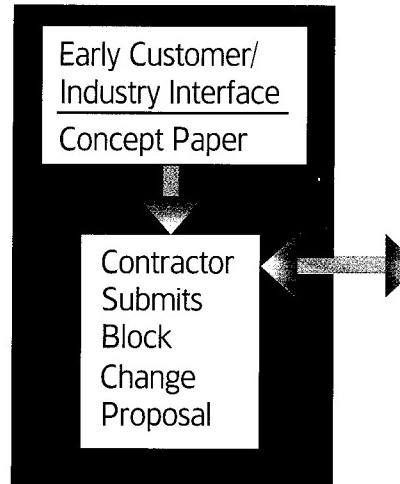
Defense Contract Audit Agency (DCAA), the customer buying activities, and the program management offices.

### DCMC Guidance

I have recently issued guidance to all DCMC field offices outlining their responsibilities in the adoption of common processes. In order to facilitate a timely and constructive exchange of information, DCMC field offices will establish a local Management Council comprised of contractors, DCMC, DCAA, and key customer representatives.

Drewes is the Deputy Director (Acquisition), Defense Logistics Agency; Commander, Defense Contract Management Command; and the Defense Logistics Agency Senior Procurement Executive.

### Step 1. Proposal Development



To assist Administrative Contracting Officers (ACO) and other functional specialists in the review of contractor proposals, I established a Block Change Management Team at Headquarters DCMC. In addition to DCMC members, the team roster also includes representatives from the Office of the Secretary of Defense (OSD), Military Departments and the Defense Logistics Agency, DCAA, and Department of Defense (DoD) Inspector General office. This team will provide a vital link between the policy makers and those charged with formulating implementation guidance.

### Key Steps of the Process

Let me walk you through some key steps that facilitate the review and disposition of common process proposals. I will also share how I believe DCMC can successfully work together with industry, the Military Depart-

ments, and DCAA on this major initiative.

**Step 1.** The first step in the process is initiated when the contractor identifies the potential area of change. The point I want to stress here is that development of the concept paper does not take place in a vacuum. There must be early interface and discussion between industry, the customer, DCAA, and DCMC to explore the viability of the change. Therefore, DCMC will be looking for a definitive concept paper. The concept paper should include a complete description of the proposed common process and a plan for transitioning to the common process. The concept paper should also include a cost/benefit analysis sufficient for industry to identify a rough order of magnitude of the cost and technical impact on existing government contracts. As indicated in Kaminski's guidance, the presumption is against obtaining detailed certified cost or pricing data. The analysis should be sufficient enough to allow rapid judgment by the ACO.

**Step 2.** The second step defines the government's actions upon receipt of the definitive concept paper. Key points that illustrate the approval phase are: establishing the management council, seeking consensus upon review and evaluation of the concept paper, coordinating with customers via component team leaders, notifying remaining customers, facilitating

## MAJ. GEN. ROBERT W. DREWES, USAF

*Deputy Director (Acquisition), Defense Logistics Agency  
Commander, Defense Contract Management Command  
Defense Logistics Agency Senior Procurement Executive*

In his role as Deputy Director for Acquisition, Maj. Gen. Robert W. Drewes, USAF, is responsible for policy and oversight of the Defense Logistics Agency's \$9 billion procurement operations, executed by more than 3,000 procurement personnel located throughout the Agency. The Defense Contract Management Command and its 17,000 personnel perform contract administration worldwide on more than 378,000 contracts valued in excess of \$849 billion.

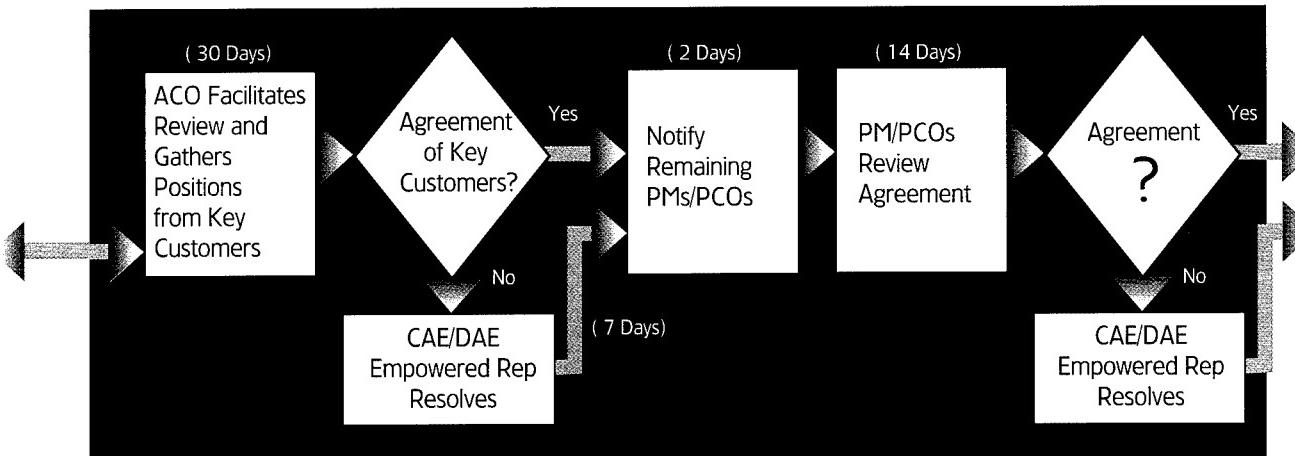


Drewes entered the Air Force in 1964 as a distinguished graduate of the Colby College Reserve Officer Training Corps program. Throughout his 32-year military career, he has served in several key positions: Contracting Officer; Commander of a Defense Plant Representatives Office; Director of Contracting at a Numbered Air Force equivalent; Director of a Major Command; and Military Advisor in the Executive Office of the President. In addition to his current assignment, he assumed the additional duty of Competition Advocate General of the Air Force in June 1994.

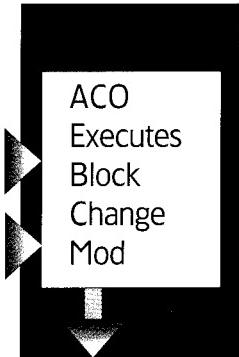
Drewes holds an M.B.A. from Harvard Business School, 1970. He is a graduate of Air Command and Staff College, Air University, Maxwell Air Force Base, Alabama (1977); and the Industrial College of the Armed Forces, Fort Lesley J. McNair, Washington, D.C. (1985).

His military decorations include the Defense Superior Service Medal, the Legion of Merit (1st Oak Leaf Cluster), the Meritorious Service Medal (1st Oak Leaf Cluster), and the Joint Service Commendation Medal.

### Step 2. Approval



### Step 3. **Contract Modification**



appeals, and lastly dispositioning the common process proposal. The bias in this phase is toward achieving approval within defined time frames. Component Acquisition Executives and the Defense Acquisition Executive (CAE/DAE) play a crucial role in this phase through quick resolution of any disputes. During this phase, DCMC wears a facilitator's hat as the focus shifts to communication and coordination in bringing about final approval.

I recognize many block change proposals may be complex. Therefore, field-level SWAT teams will be established to assist local offices in reviewing proposals when needed.

**Step 3.** The third step is execution of the block change modification by the ACO. If technical concurrence is obtained, the ACO will immediately proceed with contract modifications

while trying to negotiate terms of an equitable adjustment (consideration), if any.

**Step 4.** The fourth and final step is implementation.

### **DCMC Roles and Responsibilities**

Through the entire process, there are well-defined roles and responsibilities for industry, the Military Services, DCAA, and DCMC. As mentioned earlier, I've established a DCMC Block Change Management Team to ensure DCMC fulfills its responsibilities. Its charter is to facilitate DCMC field office implementation.

The team is tasked with providing assistance to ACOs and refining guidelines for processing and negotiating Block Changes. They will also support DCMC field-level SWAT teams who provide technical and business expertise directly to ACOs. The headquarters team will also collect and dis-

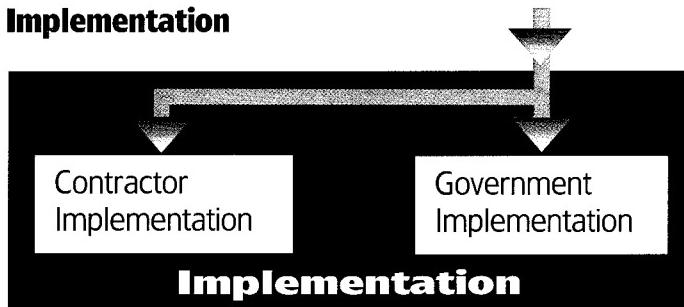
tribute lessons learned. They will be monitoring execution of the initiative and will keep me, OSD, CAEs and the DAE informed.

### **Conclusion**

I started this article by stating that adoption of common processes is a critical component of acquisition reform. It is a method to expedite DoD's transition wherever possible away from unique DoD requirements. It is an excellent vehicle for DoD and industry, working together, to realize significant improvements in the acquisition process. As a result, DCMC is committed to take whatever actions are necessary to make this a success.

For further information or questions concerning the Defense Contract Management Command and its implementation of common processes, please contact Mr. Jim Bauer at (703) 767-2471 or DSN 427-2471.

### **Step 4. Implementation**



## DSMC & ROYAL MILITARY COLLEGE OF SCIENCE TO CONDUCT INTERNATIONAL SEMINAR

**T**he Eighth Annual Acquisition/Procurement Seminar focuses on international acquisition practices and cooperative programs. The seminar is sponsored by the International Defense Educational Arrangement (IDEA), an arrangement between defense acquisition educational institutions in the United Kingdom, Germany, France, and the United States.

Those eligible to attend are Defense Department/Ministry and defense industry employees from the four IDEA nations who are actively engaged in international defense acquisition programs. Other nations may participate by invitation. Nations participating in past seminars were Australia, Belgium, Canada, Denmark, Italy, The Netherlands, Norway, Portugal, Spain, and Switzerland.

This year the seminar will be held July 8-12, 1996, at the Royal Military College of Science (RMCS), Shrivenham, Wiltshire, United Kingdom (1.5 hours west of London or Heathrow Airport by

train). The last day of the seminar, July 12, will be an optional day for those interested in the educational aspects of international acquisition.

The IDEA Seminar is by invitation only. Those who have not attended past IDEA Seminars desiring an invitation should contact the IDEA team at DSMC. Those U.S. DoD personnel receiving an invitation should submit an approved DD Form 1556 with a copy to DSMC by telefax. Industry representatives should submit letterhead requests by telefax. Invitations and confirmations will be issued after May 1, 1996.

#### **For more information, contact: IDEA Team Members**

Prof. Richard Kwatnoski

Director, International Acquisition Courses or Lisa Hicks  
Comm: (703)805-2549/4592      DSN: 655-2549/4592  
Telefax: (703)805-3175

# A Logistics "Think Piece"

## How Far Have We Progressed?

HARVEY L. BURNSTEEL

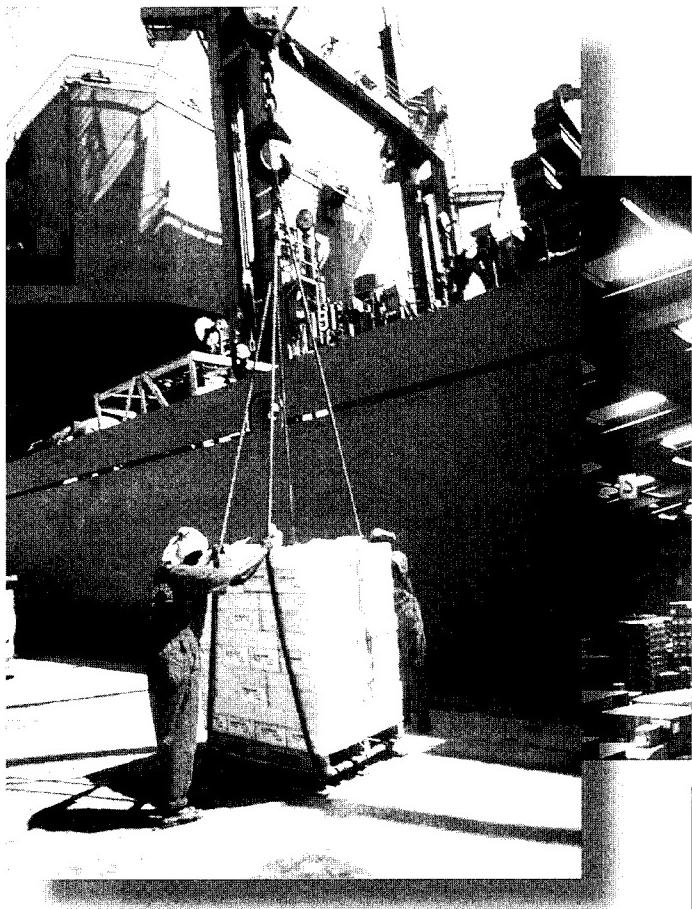
**H**ow far have we progressed in logistics management systems? This article focuses on two key logistics areas: general supplies and ammunition. It is not an academic paper supported with numerous footnotes and extensive research data, the article is replete with my personal experiences and involvement, and discussions with knowledgeable persons. I ask you, the reader, to accept on good faith that all of the historical events noted below in fact happened.

### Well-intended, But Do They Work?

My challenge in writing this article was to be creative and provide a logistics think piece. Indeed, I intend to make you think. Comparisons, actually juxtapositions, will be made of logistics operating systems and the realities confronting the logistics operators actually using the systems. The irony, and perhaps humor, is that the systems I will describe in this article were well intended and met all of the checkmarks; but, they just did not work. That is not to say the systems were not good or they failed. What did not work was a combination of things.

A former Commander of the U.S. Army Support Group for Desert Storm stated it best: "The systems were never tested with Pvt. Murphy under conditions of total chaos." I will identify problems, but in fact do not plan to offer solutions. I intend to make you think. I want you to realize and think about well-intended and executed programs that sometimes just do not work. And, if you ever become a program manager, I hope that your

► STEVEDORES AT THE PORT OF JEDDAH, SAUDI ARABIA, POSITION CARGO ROPES BENEATH PALLETIZED SUPPLIES FOR LOADING ABOARD THE USNS SIRIUS (TAFS-8), A NAVAL FLEET AUXILIARY FORCE COMBAT STORES SHIP OF THE MILITARY SEALIFT COMMAND, IN MARCH 1991, FOR OPERATION DESERT STORM.



U.S. Army photo



Burnsteel is currently a General Engineer, Office of the Deputy Chief of Staff for Ammunition, Headquarters, Army Materiel Command. He is also a graduate of PMC 94-1, DSMC.

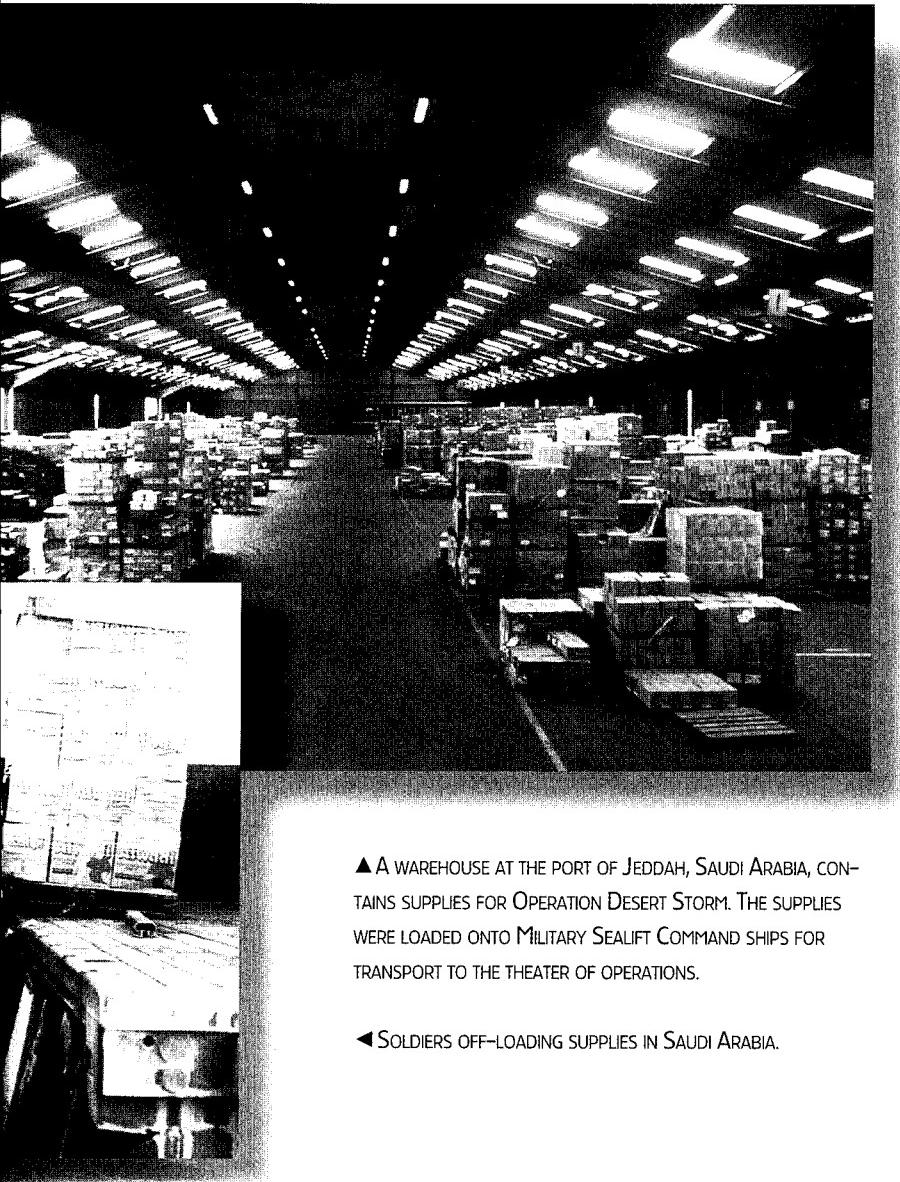
thought process would be: "What can I do to at least plan for such unplanned events," rather than, "Boy did they screw that up." I would be willing to bet that the program managers or their equivalents for the systems I will describe in this article were quite sure that they had covered all of the possibilities, and that success was therefore certain.

### Rationalization Trap

Requirements provides a rationalization trap that is easy to fall into. If the

requirements do not specify the specific operating conditions in effect, then the designers of the system cannot be faulted for its nonperformance. I will not debate the pros and cons of this issue. Personally, however, I believe it is a cop-out.

Let me give an example. This episode illustrates what I call the "was not in my requirements" lament. At the same time, I will provide my first scenario of a well-intended Logistics System that went sour.



▲ A WAREHOUSE AT THE PORT OF JEDDAH, SAUDI ARABIA, CONTAINS SUPPLIES FOR OPERATION DESERT STORM. THE SUPPLIES WERE LOADED ONTO MILITARY SEALIFT COMMAND SHIPS FOR TRANSPORT TO THE THEATER OF OPERATIONS.

◀ SOLDIERS OFF-LOADING SUPPLIES IN SAUDI ARABIA.

### The Study That Wasn't

During the Viet Nam War [yes, I am going to tell a war story, so sit back, relax, and think], after three years in Army Logistics, I got a chance to practice practical logistics. I commanded a forward support maintenance and supply company in an infantry division. The C/709th was Charlie Company, 709th Maintenance Battalion, 9th Infantry Division.

During my command, a review team from the continental United States (CONUS) was surveying the combat performance of logistics units. They were specifically interested in "riverine units." Loosely defined, riverine meant that all of the combat operations of the division were centered about a river. Soldiers moved to starting positions by boat, supporting fire came from gun-boats and Paddy Platforms, and billets were barges in the river, etc.

The U.S. Army Combat Developments Command (CDC) performed the survey. They were the predecessor of the current Army doctrine agency, Training and Doctrine Command. The team briefed senior division logistics officials: G-4, Division Support Command (DISCOM) Commander, etc., and requested a list of company-sized units they could survey. Their survey was mostly a comprehensive questionnaire:

*Do you, Unit Commander, have enough of the right kind of assets per the standard Table of Organization and Equipment (TO&E) to do the present assigned job?*

Well, whoever would believe that they'd actually ask a poor slug in the field if enough tools, personnel, etc., were on-hand to do the job? What a marvelous idea! Step right this way folks. I diligently filled out the questionnaire, used up the generous space provided for "additional comments," and sent it forward.

My next assignment was, coincidentally, on the post where the Ordnance CDC field office was located. I always had the suspicion that the survey

requirement of a "through-channels endorsement" was a guaranteed mechanism to filter my comments. To my surprise and to the credit of both the DISCOM Commander and the Division G-4, my survey came through untouched except for the required forwarding endorsement.

What was the final result? The CDC threw out the entire questionnaire! Their reason: The requirement for the C/709th was to assess a TO&E logistics unit in a riverine environment. But, the C/709th, and in fact the entire 9th Infantry Division, was operating under an approved *modified* TO&E; therefore, we were disqualified. What garbage! The logistics doctrine agency, CDC, set out to evaluate logistics units in combat. But, they disqualified the responses from the units operating *under the very conditions they wished to study*. Why? Because the CDC team determined that those units were not organized under a preconceived and approved *standard* TO&E.

The entire study failed. The planners had to admit there were no standard units to evaluate, and they stood on the requirement that only standard units qualified. The opportunity to learn from the past to plan a better future was lost. You decide; was it a cop-out?

### **Wait, There's More to the Story**

Since we are there [Viet Nam], let's stay awhile. The C/709th operated a 3,000+ line item authorized stockage list for its customers. Customers were a reinforced infantry brigade and all of its assigned and attached units. Principal among the latter was an artillery battalion. The entire receipt, storage, and issue of repair parts was a manual, labor-intensive operation. The single concession to automation was an IBM 026 keypunch for requisitions going forward. Two noncommissioned officers (NCO) and 13 enlisted men operated the warehouse and the records section.

Before I proceed any further, I need to explain the basic supply accounting

procedures in those early years. If I said all calculations were automated, you would probably not give it another thought. And, if I said all calculations were manual, you would not have any appreciation for the effort. Let's return for a short course in Technical Supply Procedures 101.

In those days, supply personnel prepared handwritten customer requests or requisitions on preprinted forms. A requisition for an item, independent of quantity desired, was a demand. Three demands for an item in any 90-day period qualified that item for stockage. The amount stocked was calculated using a formula requiring basic arithmetic. This task was normally performed by an individual no higher ranking than grade E4, using an adding machine, a modicum of brain-power, a stubby pencil, and a whole family of preprinted forms.

### **Basic Operating Parameters**

Armed with such modern, labor-saving devices, the NCO was expected to calculate basic operating parameters: the maximum quantity to be stocked (Requisitioning Objective); the inventory level where replenishment was required (Reorder Point); and the level at which stocked items must never go below, which required a priority requisition if reached (Safety Level).

The performance measures were Demand Satisfaction and Demand Accommodation. Accommodation was a simple fraction; requested items divided by items stocked. Satisfaction was equally simple; requests for items stocked and immediately filled (satisfied) divided by requests for items stocked. The goals were 85 percent and 95 percent respectively. All supply transactions were posted daily and manually to the 3,000+ stock record cards. This entire effort was dependent on many things, with receipt of supplies at the top of the list.

### **"Lost in the Depot"**

The depot at Long Binh, my source of supply, was collocated with the theater

Inventory Control Center, the 14th ICC. Except for items requiring environmental protection, batteries were refrigerated; all Class VII and IX repair parts were stored outside. Some were on hardstand, and some were covered. Overall, the 14th ICC had passable internal records. That is to say, the ICC was able to account for items shipped to them and received in their storage yard. But, more often than not, they had no idea where in the yard the item was!

Warehouse discipline and the enormous amount of supplies moving in and around the yard contributed to this "lost-in-the-depot" situation. Supplies were off-loaded quickly and placed in a convenient location, probably the first open pad the forklift driver found. In haste to drop this pallet and get the next one, the driver either did not report or incorrectly reported the location of the pallet.

When this error was discovered, it was far too late to ask the driver to recall the exact location of the pallet of widgets. In fact, before the day was over, it was too late to ask any warehouseman or forklift driver the exact location of a particular pallet of goods. The important point is that the item manager knew 1,000 widgets were just delivered, and now the backorders for widgets could be released. But, nobody had a correct location for the 1,000 widgets.

If supplies are essentially lost in the depot, the item manager cannot release any customer requisitions for the lost items. After a few material release denials, the internal audit section of the depot goes into action. Under more normal conditions, this would be as simple as going to the reported location and confirming whether or not the assets were in fact there. After this initial look, a local Standard Operating Procedure to find the missing supplies would usually be successful. But, item managers were overwhelmed by the number of denials; they could not even begin to research and correct each one.

If this had occurred under conditions much less hectic, a 100-percent, wall-to-wall inventory would be done to establish a correct baseline. However, closing the depot for a 100-percent inventory was out of the question. Even if a good location survey and count were done, the mechanism that caused the problem was not fixed. The first day of yard operations would start the error cycle anew. This sounds too ludicrous to have any semblance of truth – but it happened.

### **The Solution — Symbiosis and Greed**

The immediate solution, at least for the 14th ICC customer, was a combination of symbiosis and greed. The solution - an earlier-era MRE [not meals ready to eat, but Materiel Release Expeditors]. I and the other customer units were granted permission to allow highly qualified individuals free access to the depot storage area, with the single caveat that they remove nothing. The MREs were maintenance and supply NCOs who knew what the outer package of a widget looked like. They found items solely by recognition of the box.

Now enters the greed and symbiosis. The MRE team wrote down the exact location and quantity of the "found goods"; then the senior NCO had a short talk with the item manager.

**Sergeant:** When are you going to release my requisition for 10 generator engines.

**Supply NCO:** I've cut a dozen releases for those engines and all of them came back denied. My record says there are over 100 in the depot, but the warehouse foreman can't find one!

**Sergeant:** Well, if I tell you where all 100 are, will you give me my 10 up front?

**Supply NCO:** Sergeant, you know that I have to issue all requisitions based on priority and

**Containers did not identify what was inside! Generally, the last item stuffed was used for transportation movement purposes, and no other external data noted what was inside.**

age, and I can't just give you 10 up front for the C/709th.

**Sergeant:** Well, seems to me if I don't get my 10, you may never find the 100, and a whole lot of customers will be unhappy. But, if I get my 10, you get to release 90 against your due-outs, and it seems to me that those customers would be most grateful to you."

After the first few rounds of this quid-pro-quid routine, the item managers quickly saw that they were the victim of friendly blackmail, which in reality had no real victim. It was better to capitulate rather than argue the impropriety. To legitimatize the event, the MRE team got to carry a walk-through release for the 10 items. Simultaneously, the item manager obtained a correct location for the lost assets and promptly cut releases for the remaining 90, which miraculously were released rather than denied.

If the day was successful, my MRE team would have a truck full of sup-

plies on the road at first light the next day. My investment was generally three senior supply or maintenance technicians, one jeep for their use, and two trucks with drivers on a round-robin circuit. My Return on Investment was satisfactory supply performance.

### **But What's Inside?**

One more illustration in this time period, and then we will move on. Its importance will become obvious later. Supplies coming into the theater were universally identified as "X 60-foot containers with Z short tons of general supplies." When a specific container was shipped to the 14th ICC, the contents were a mystery. If a shipping document was outside the container, it merely identified one of the items inside and listed total tons. If one was lucky, a complete printout of contents was inside the container. If the container went to a break-bulk issue point, this procedure was even more aggravating since the items inside were for many customers versus a single customer, and every package had to be read to see who got it.

Apparently, this situation was never corrected. It fell into the "That can't be so" syndrome. It was commonly assumed that CONUS depots and ports knew what they shipped. But, in fact they were never certain what ship carried what goods. At an Ordnance Corps dinner at Aberdeen Proving Ground, a former Commanding General of the First Logistics Command stated that this situation of unidentified short tons of cargo was one of the most aggravating problems during his [Viet Nam] tour. The shippers, for their part, were only concerned about hazardous cargo, cube, and weight; the "eaches" and "whatsits" never concerned them.

### **Now Let's Go to Saudi Arabia**

Let's make a quantum leap to an area support group assigned to the U.S. Army Support Group (USASG) in Saudi Arabia during Desert Shield/Storm. The USASG was the only theater general support supply

and maintenance activity. Its subordinate units had modern computers to do all of the necessary supply accounting procedures associated with receipt, storage, and issue. The computer was wonderful (I don't know what it was called, and the name is not important for this paper). The clerk entered information at the keyboard, pushed enter or some other function key, and the computer did its thing. Among other things, the output was used to release repair parts to customers and forward requisitions to either sister units who stock items not on-hand, or to the group headquarters for replenishment.

### **Enter the "Sneaker Net"**

There was, however, a single monumental problem: the logistics units could not interconnect the computers to take advantage of their collective ability as a network. Someone forgot about it! Presumably, goes the story, such units would only be deployed to an established theater where a communications infrastructure would be in-place. They either were not expected or not supposed to go into an area that was completely devoid of any military communications infrastructure.

To his indomitable credit, Pvt. Murphy solved the communications problem; enter the "sneaker net." When enough data are processed to fit on a floppy disk, you stop processing, save, download to a floppy, put on your sneakers, and run the disk to the next computer. It works! But, you do this at least once a day. How many times did a disk get trashed in-transit? I did not ask, but I bet it was more than zero.

Another problem was transaction volume. The computer systems were quickly saturated with the volume of transactions they were expected to run. Am I telling the same story but only changing the playbill? No! I assure you this is a new story!

Volume was a little harder to solve. A solution was implemented, but its reliability was not always what was desired. Burst technology was its

**...the logistics  
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name. Basically an entire data run was compressed, and a burst of data was dumped to the disk. Then the sneaker net transported this burst disk to the next computer, and the disk and new computer did a reverse burst. This was expensive and not 100-percent reliable.

### **That Old Bugaboo Resurfaces - What's Inside?**

One final aggravation hampered supply discipline for Desert Storm. Containers did not identify what was inside! Generally, the last item stuffed was used for transportation movement purposes, and no other external data noted what was inside. The war ended too soon to correct this. The logisticians who were there after the 100 hours' conflict spent the next 12 months opening containers, inventorying the contents, and picking the assets up on accountable records.

Prior to and during the 100 hours' conflict, this "no-identity" problem was not a problem. Why? For every one item needed, multiple priority 02 requisitions were submitted. Supply discipline did not exist. So, the chances of

just stumbling across a needed item were high, given the multiple requisitioning.

### **Ammunition - A Whole New Ball of Wax**

It is generally accepted that food, water, and ammunition are absolute necessities for combat. When all three are available, we can hold out for some time; and if not available, we are down to a few days of survival. So, we must be able to account for ammunition. When Desert Shield started, the Army was implementing a controversial headquarters decision; the accountable record for all Army ammunition would be at Headquarters, Army Materiel Command (AMC). Only ammunition in a soldier's possession was dropped from the record. The AMC owned all of the rest. A theater commander might have physical custody of war reserve assets, but Army owned it through their agent, AMC.

For Desert Shield/Storm, ammunition movement anywhere inside the lower 48 states was highly accurate. We knew exactly what was in each truck on the highway. We knew when it departed, who was driving, and when it should arrive. We knew exactly where the truck was on the highway; most were tracked by satellite. Those not on the satellite called in at least every 24 hours. We planned what truck would be at what port and what ship would transport the ammunition to the theater. But, asset visibility at the port of embarkation began to break down.

As stated earlier, ships are cube and tonnage devices. We wanted container XJR to go on ship L, but that container was 9th in line, and the ship only needed two more containers. So the first two in line went aboard. Container XJR went on ship Q on the other side of the pier. Unfortunately, the accountable record did not get this last-minute change. When ships were unloaded at the port of debarkation, all asset visibility was lost. We only knew that X tons of bullets were shipped and off-loaded.

What was the magnitude of this? The theater commander was not amused. He wanted exact locations of exact types of ammunition, especially tank ammunition. According to official records, 878,000 tons of DoD ammunition were shipped! This equates to 14,630 railroad cars; 43,900 trailers; or 135 ships. And, when it was all over, what did we know or learn? We knew it did not work as planned. We knew what was shipped and off-loaded; shipped and turned around in mid-ocean (war ended, not needed, or broken ship); and what was retrograded. The simple arithmetic difference is logistics losses for Operation Desert Storm. Combat consumption is a sub-element of these losses.

Well, do good systems always work? If not, is it or was it the fault of the system? I do not have an answer; I've been writing not thinking. But you have been thinking. I have a final item for those thoughts. Three of the above systems were designed to effectively do receipt, storage, and issue. They span 25 years of logistics, from adding machines and stubby pencils to modern computers. Each depended on intelligent input. But, none received intelligent input on incoming supplies. Did they and are we putting emphasis on the wrong controlling factor? How could we have repeated the same errors made in Viet Nam 25 years earlier, 25 years later in Saudi Arabia? Have we progressed at all? You decide.

**A Word From the Author:** The Desert Storm and Viet Nam experiences described in the preceding article were my own personal experiences. I was actively engaged in the situations noted. For brevity's sake, I shortened much of the situations recounted and left out many of the details. The data related to the U.S. Army Support Group came from Col. W. Martinous, U.S. Army (Retired), a former Commander of the Group and good friend. Comments by the Commanding General of the First Logistics Command were given at a dinner speech to my class, by Lt. Gen. Heiser, U.S. Army, in 1970.



ON JANUARY 23, 1996, THE DEFENSE SYSTEMS MANAGEMENT COLLEGE WELCOMED OVER 400 STUDENTS TO ITS ADVANCED PROGRAM MANAGEMENT COURSE (APMC 96-1). AUTOMATED BADGING EQUIPMENT LINKED TO REGISTRAR DATABASE INFORMATION ALLOWED THE COLLEGE INPROCESSING TEAM TO REGISTER AND BADGE OVER 400 STUDENTS IN UNDER TWO HOURS. FROM LEFT: YEOMAN 1ST CLASS NILSA SWIFT, NAVY LIAISON; EARL FREDDIE, DEPARTMENT OF NAVY, APMC 96-1; CAPT. DALE JACKMAN, USAF, APMC 96-1; CAPT WILLIAM L. SHUTT, USN, APMC 96-1; LT. COL THOMAS V. DEMARS, JR., APMC 96-1; JANET VINCENT, COURSE ADMINISTRATOR, APMC 96-1.



ON HAND TO GREET THE STUDENTS AND CONDUCT THE CLASS CONVOCATION FOR APMC 96-1 WERE FROM LEFT: BRIG. GEN. CLAUDE M. BOLTON, JR., USAF, DSMC COMMANDANT; MAJ. BRAD SHAFFER, USA, TRAINING AND DOCTRINE COMMAND, FORT MONROE, VA. (STUDENT); MRS. COLLEEN PRESTON, DEPUTY UNDER SECRETARY OF DEFENSE (ACQUISITION REFORM); MR. ROBERT FREDRICH, ISAC STUDENT; AND MAJ. NELL STINE, USAF, FORT MEADE, MD. (STUDENT).

# NSSN — New Attack Submarine

## U.S. Navy's "Paper Submarine" Undergoes Exhaustive Early Operational Assessment

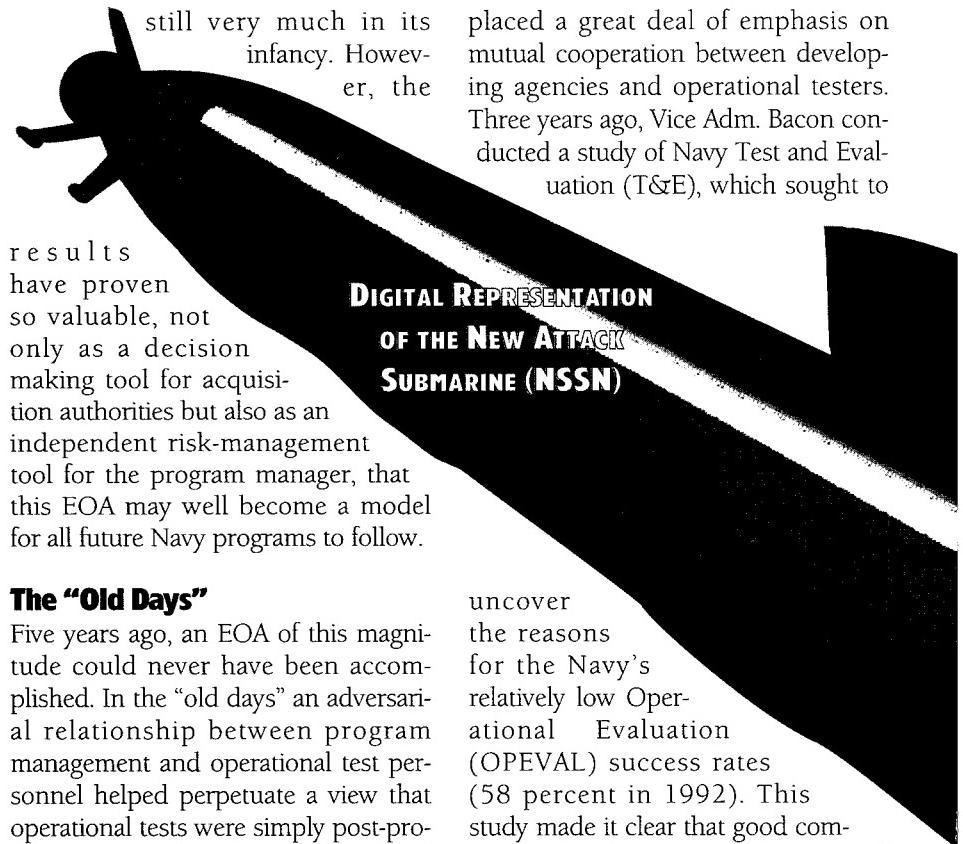
LT. JAMES R. BARNEY, USN  
REAR ADM. JOHN J. ZERR, USN

The New Attack Submarine will be the Navy's undersea weapon of choice for the 21st Century. With unsurpassed quieting, state-of-the-art computer technology, and precision targeting capability, the NSSN will be the most advanced weapons delivery system in the world. But today, what will eventually become a formidable, 7,500-ton warfighting machine, is simply a vast collection of plans, diagrams, and schematics, which occupy filing cabinets and computer disks at selected locations around the country.

### Getting Started

In one sense, however, the New Attack Submarine has already been to sea and operated in a wartime environment. In the spring of 1995, without ever leaving the drawing board, or more accurately, the drawing board's digital database equivalent, this "paper submarine" underwent an exhaustive Early Operational Assessment (EOA) by the Navy's Operational Test and Evaluation Force (OPTEVFOR).

The EOA of the New Attack Submarine (NSSN), which was completed in just 10 weeks, was the first of its kind for the Navy. Never before had such a thorough EOA been conducted for a large program so early in a project's development. Critics questioned the worth of assessing a program that was



still very much in its infancy. However, the results have proven so valuable, not only as a decision making tool for acquisition authorities but also as an independent risk-management tool for the program manager, that this EOA may well become a model for all future Navy programs to follow.

### The "Old Days"

Five years ago, an EOA of this magnitude could never have been accomplished. In the "old days" an adversarial relationship between program management and operational test personnel helped perpetuate a view that operational tests were simply post-production Quality Assurance (QA) checks. Although these QA checks could be effective, they were not very efficient because they were performed at the end of program development. On some programs, problems would be discovered requiring further development and delay in fielding the new system.

Recently, however, in the spirit of acquisition streamlining, the Navy has

placed a great deal of emphasis on mutual cooperation between developing agencies and operational testers. Three years ago, Vice Adm. Bacon conducted a study of Navy Test and Evaluation (T&E), which sought to

uncover the reasons for the Navy's relatively low Operational Evaluation (OPEVAL) success rates (58 percent in 1992). This study made it clear that good communication between T&E personnel and program management from early-on gave programs a head start toward undergoing a successful OPEVAL. To this end, EOAs are an excellent way for operational testers to provide essential information to system developing activities, which can greatly improve chances for a successful OPEVAL.

### Adding Value — How Early is Too Early?

The task of conducting the NSSN EOA in a scant 10 weeks fell to Capt. William M. Espinosa, USN, head of

Barney is the Operational Test Director for Submarine Communications, Operational Test and Evaluation Force (OPTEVFOR), Norfolk, Va.  
Zerr is the Commander, OPTEVFOR, Norfolk, Va.

OPTEVFOR's Undersea Warfare Division. His first task was to decide what to look at and how to organize the evaluation effort. How could OPTEVFOR add value to a development process that hadn't yet completed the detailed design stage? Without detailed designs, how could we make a determination of potential operational effectiveness?

The answers to these questions were manifested in a unique, integrated approach to the NSSN EOA. Rather than focusing exclusively on design, this EOA addressed all aspects of the project: development, design, requirements, technology, and management. The results not only provided an assessment of the early system designs, but also validated the program requirements, the feasibility of technical development, and the effectiveness of program plans.

This integrated assessment provided acquisition authorities with the information they needed to make a n

## **The EOA of the New Attack Submarine (NSSN), which was completed in just 10 weeks, was the first of its kind for the Navy.**

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concept. Cmdr. Tom McCarthy, USN, a senior member of the OPTEVFOR Undersea Warfare Division, was put in charge of developing the EOA IPT and executing the ambitious project. At its largest, this team numbered nearly 70 members, including 35 members of OPTEVFOR and 31 representatives of Naval Undersea Warfare Center Detachment (NUWC DET) Hawaii.

The majority of the team was organized into 16 System Investigation Teams (SIT), each of which consisted of an officer or senior enlisted member of O P T E V - F O R ' s Undersea Warfare Division and a representative from

NUWC DET Hawaii. The numerous Critical Operational Issues (COI) that were applicable to the NSSN program were divided up among the SITs so

informed, independent decision as to whether to allow the NSSN program to proceed.

### **A Team Effort**

The EOA effort was organized using the Integrated Product Team (IPT)

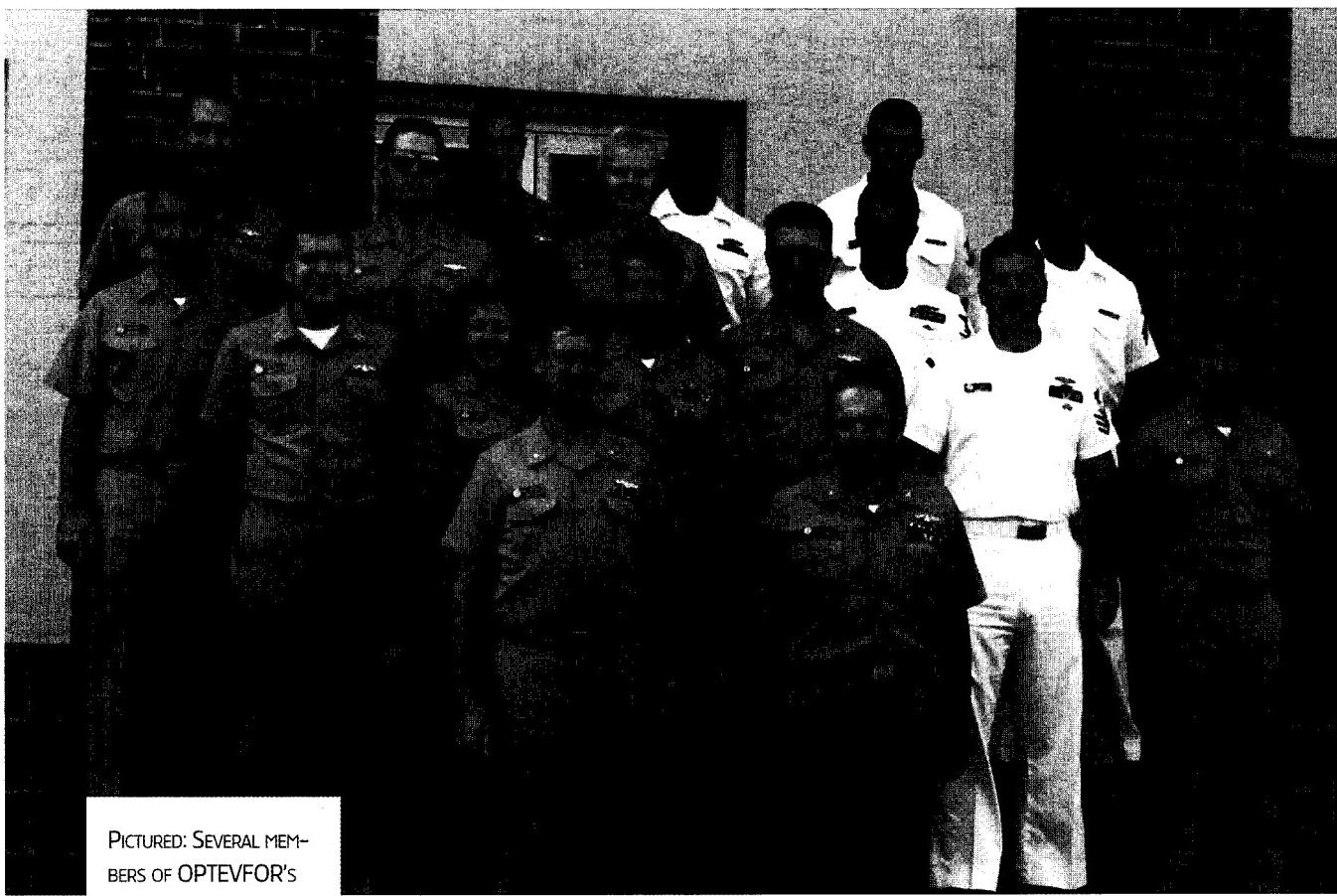
that each two-man team could concentrate on a relatively small slice of the pie. The remaining members of the team were assigned support roles, including editing, analysis, and information coordination.

A Senior Advisory Committee (SAC), led by Espinosa, was created to provide oversight and guidance to the team as the EOA progressed. This committee consisted exclusively of senior, post-command captains, from all warfare areas, and their civilian counterparts both at OPTEVFOR and NUWC DET Hawaii. With their broad spectrum of warfare specialties and their vast experience in both the fleet and the T&E world, the SAC infused a great deal of insight and maturity into the EOA process while still empowering individual SIT members to make judgments and recommendations.

### **Interagency Cooperation**

With most systems only in the early design phase, and with work being conducted in laboratories and test sites all over the country, the amount of information that had to be gathered for the EOA was staggering. The superb cooperation of the program office was absolutely essential for gathering this information and completing the EOA on time. In this regard, the program office was very much a part of the Operational Test and Evaluation (OT&E) IPT, providing in-house information as well as interfacing with various laboratories and contractors on a daily basis.

Where highly specialized expertise was needed, such as estimates of the state of technology available in the future, experts were called upon from academia. The team worked with the National Science Foundation's (NSF) Engineering and Advanced Technology Division as well as the Maritime Systems Office of the Advanced Research Projects Agency (ARPA) to resolve highly technical issues and to obtain independent expert opinions. The outstanding support from NSF and ARPA provided valuable insight



PICTURED: SEVERAL MEMBERS OF OPTEVFOR'S NSSN EOA TEAM, NORFOLK, VIRGINIA, 1995.

into the advanced technology being planned for the NSSN. Future collaborative efforts with these agencies should be considered for any significant OT&E effort involving leading-edge technology.

#### A Four-phased Approach

The procedures for conducting the EOA were developed in coordination with the Department of Defense Director, Operational Test and Evaluation (DOT&E). A four-phased approach was decided upon. In Phase I, the investigation phase, the SITs gathered high-level information on the systems which affected their COIs, establishing the necessary contacts at the program office, developmental test sites, and other appropriate agencies. At the end of Phase I, they briefed the results of their investigations to the SAC. These briefs, which were conducted over a three-day period at a Video Teleconferencing (VTC) facility, allowed the SAC

members at OPTEVFOR and NUWC DET Hawaii to fully interact with SIT team members. The use of a VTC facility, which saved precious time and scarce travel funds, is a valuable resource for any IPT whose team members are scattered over a wide area.

During Phase II, the SAC reviewed the SITs' inputs in depth, validating the Phase I findings and providing feedback and guidance to the investigation teams. The principal purpose of this phase was to decide where to target the Phase III evaluation for the greatest payoff.

Phase III consisted of an in-depth review of each COI by the SITs, focusing especially on systems that the SAC (in phase II) viewed as potentially the highest risk. During this phase, members of the team arranged various meetings with program management and laboratory personnel, including on-site visits to test facilities, in order to answer unresolved issues from previous phases. Another series of VTC

briefings was given to the SAC at the end of Phase III.

Finally, during Phase IV, the SAC reviewed in detail the results provided by each SIT. Each investigation team drafted an input for the final report, addressing their assigned COIs, and submitted it electronically to an editing and collating team. Once all the inputs were consolidated and edited, the smooth final report was produced.

#### Clarifying Requirements

The stated purpose of this EOA was to provide an independent assessment of the NSSN program to support a milestone II decision to proceed. A three-fold method was used to achieve this goal: assessing whether the design met the requirements, determining the technical risk of developing new technology systems, and assessing the adequacy of the program plans. From the beginning, however, it became apparent that another goal would have to be accomplished in order to conduct the EOA. This task was to clarify the program requirements.

At first glance, the requirements seemed well defined; however, on closer inspection several requirements parameters were open to various interpretations over a range of values, rather than being specifically nailed down. A requirements clarification team was formed and worked for a week to remove all uncertainty from the requirements. This team produced an "Operational Requirements Document (ORD) Clarification" to ensure that the developing agency and operational testers interpreted requirements the same way.

This was important because the first step of the EOA was to compare the proposed design for each NSSN system with the requirements stated in the ORD. The "ORD Clarification," once agreed upon by OPTEVFOR, the program sponsor, and the program manager, became an extremely useful tool during the EOA: a clear, concise statement of the requirements that was still flexible enough to be updated as necessary. In fact, OPTEVFOR found the "ORD Clarification" so helpful that the concept is recommended for all programs.

## Determining Risk

Having compared the intended designs to the requirements, team members next looked at the level of new technology that was involved with each system under development. Each system was assigned a degree of technical risk, depending on the perceived difficulty of developing the necessary technology and the amount of time available to do so. Risk levels were color coded into green, yellow, or red in order to create an easy-to-read format, free of excess verbiage, that decision makers could absorb at a glance.

Finally, the team addressed the program plans for the various systems and evaluated them in terms of risk. Investigators reviewed the program manager's risk mitigation plans and considered the amount of lead time available as well as the amount of work that had already been comple-

**The NSSN EOA was a landmark achievement for the Navy, and it exemplified the type of cooperation between the Office of the Secretary of Defense, program sponsors, program managers, and operational testers that is necessary to make streamlined acquisitions a reality.**

ed. From this information, the SIT made a judgment, validated by the SAC, as to whether the program plan was adequate for the risk involved. For the NSSN program, almost all program plans were found to be adequate, but for the most challenging areas, a recommendation was made for continued management attention as well as additional OPTEVFOR assessment points as the development proceeds.

## Information — the Future Is Online

The key to performing an EOA of this magnitude is being able to access an enormous amount of information in a short amount of time. Of approximately \$700K that was spent on the NSSN EOA, well over half of it went to paying salaries and overhead for the retrieval of information. Although online services allowed us to tap into the T&E network database, we found that the majority of the information we needed still had to be retrieved manually, at considerable expense. This was primarily due to the lack of Wide Area

Network (WAN) connectivity to automated program resources.

Navy systems commands and program offices, NSSN in particular, are currently automating all of their information. They have found this to be a very cost-effective means of data management, and the Navy OT&E community could also realize huge benefits by tapping into these networks. For instance, the NSSN EOA could have been produced cheaper, faster, and better had we been interconnected to both the classified and unclassified databases in existence for the NSSN. As OT&E dollars diminish in the future, the use of WANs and automated data retrieval will be an important resource for the OT&E community, and these initiatives should be funded now.

## Summary

The NSSN EOA was a landmark achievement for the Navy, and it exemplified the type of cooperation between the Office of the Secretary of Defense, program sponsors, program managers, and operational testers that is necessary to make streamlined acquisitions a reality. By using an integrated approach to this EOA, which went far beyond a design assessment, we were able to add value to the development process and support a major milestone decision. We demonstrated that the IPT approach is extremely effective for conducting large-scale EOAs by producing a high-quality product for one of the most complex programs in an unprecedented 10 weeks. Finally, we developed an ORD Clarification that may help future programs operate more efficiently, saving time and money, and producing better products for the fleet.

During recent briefings of the NSSN EOA, both the program manager and the resource sponsor expressed their appreciation and satisfaction with the report. The Honorable Philip E. Coyle III, DOT&E, said of it, "Clearly the best EOA we have seen from any Service." After such an enthusiastic response, more EOAs of this nature are sure to follow.

# Adequacy of ISO 9000 Certification for DoD Weapon System Software Development Contractors

**Let's Put the Emphasis Back Where It Belongs — On Actual Product Quality vs. ISO 9000 Certification**

JAMES H. DOBBINS

**S**uppose the Service Acquisition Authority or the Undersecretary of Defense for Acquisition, seeking to streamline the acquisition process, asked you if you could base your software source-selection decision in large measure on whether a contractor was certified by the International Standardization Organization, or ISO 9000-certified? If you must weigh your response against the knowledge that should the contractor lack ISO certification, then the government would have to perform pre-award certifications against government or commercial standards and specifications, especially for software development contractors, how would you respond? This article seeks to answer just that question.

## **ISO 9000 and Software Development Contractors**

Let's look at the advisability of relying on ISO 9000 certification of software development contractors (specifically ISO 9000-3), in light of a recent memorandum from the Secretary of Defense<sup>1</sup> directing the use of industry standards and specifications on Department of Defense (DoD) programs, and whether such ISO certification would be an adequate substitute for currently existing software development standards.

After review of the various issues involved, I concluded that ISO 9000

certification of software developers would not be an adequate substitute for existing software standards and specifications, and further, that reliance on ISO 9000 certification would only exacerbate an already serious condition. I based my conclusion on known misconceptions about ISO 9000 certification, as well as the implied significance of such certification.

## **How It All Started**

First, let me recount how the current issue of ISO 9000 certification for DoD Weapon System Software came about. In 1993 a group of industry executives produced a report, at the request of the Secretary of Defense, detailing what should be done to help streamline the acquisition process. One of their recommendations was to eliminate military manufacturing specifications and standards in favor of industry specifications and standards. This led to the formation by the Secretary of Defense of a Process Action Team (PAT) charged with responsibility to come up with an implementing strategy.

The PAT team produced their report,<sup>2</sup> which was accepted for implementation by DoD. None of the members of this PAT had any software experience other than one person who had some minimal experience with management information systems. This PAT, during

their deliberations, and without seeking counsel from experts in the field, concluded that DoD-STD-2167A and DoD-STD-2168 were manufacturing standards, whereas in reality they were processing standards, and that they required priority action for deletion. There was, at this time, no desire expressed by industry executives to do away with process standards. The PAT then recommended, in conformance with industry's report that military manufacturing standards be elimi-

THE MALCOLM BALDRIGE NATIONAL QUALITY AWARD WAS ESTABLISHED BY CONGRESS IN 1987 TO PROMOTE QUALITY AWARENESS, TO RECOGNIZE QUALITY ACHIEVEMENTS OF U.S. COMPANIES, AND TO PUBLICIZE SUCCESSFUL QUALITY STRATEGIES. THE AWARD IS NOT GIVEN FOR SPECIFIC PRODUCTS OR SERVICES. IN COOPERATION WITH THE PRIVATE SECTOR, THE NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY DEVELOPED AND MANAGES THE AWARD PROGRAM.

nated or converted to performance or nongovernment standards.

On the surface, this seemed reasonable given the difficulty industry has experienced dealing with the confusing array of over 31,000 military standards and specifications, and the unreasonable length and detail of many of the manufacturing standards and specifications. The problem we then faced was

that DoD-STD-2167A and DoD-STD-2168 were included on the list of standards to be revoked. The PAT also recommended that Mil-STD-498, Development of Weapon Systems and Information Systems (the successor of DoD-STD-2167A) not be issued; that DoD-STD-499B, Engineering Management, not be issued; and that Mil-STD-499 be deleted. The DoD software acquisition community was thus left without an adequate military standard for weapon systems development, and there was no appropriate industry standard.

## *The Malcolm Baldrige criteria are much broader than the ISO 9000 criteria, and offer more in the way of overall contractor maturity.*

### **Setting the Record Straight**

One issue which merits attention is whether the ISO 9000 certification process is rigorous enough to provide a level of assurance to the DoD that software, developed by companies that are ISO 9000-certified, would possess the same or higher levels of quality than that produced under the requirements of pre-existing military software standards identified above.

Before we can make any determination as to whether requiring ISO 9000 certification for DoD software development contractors is desirable or even meaningful, and to put this into proper perspective with other quality-related activities, we have to understand what ISO 9000 certification really means.

Many people in the DoD assume that being ISO 9000-certified means that the products produced will be high-quality products. Likewise, many in industry are operating under the mistaken belief that the DoD now requires companies to be ISO 9000-certified. This is decidedly not the case on both counts.

A DoD spokesperson, Beverly Baker, set the record straight. Although it was reported in the trade press, it seems few have gotten her message that, "ISO 9000 will not be our standard of choice. Contractors who want to do business with the military can use military, other national, or ISO 9000 specs." Since so many in industry seem to have been moving swiftly toward ISO 9000 certification, the ambivalence of Baker's statement might seem surprising to some, but it was a well-considered position, especially for software development.

To understand the position she has articulated, and my assertion that ISO 9000 certification in no way equals pre-existing military software standards, it is necessary to understand what ISO 9000 certification could mean, and some of the implications of current activities here in the United States and in Europe.

### **What Does ISO Certification Mean?**

One thing that is very important to understand is that ISO 9000 certification means little more than the company's affirmation that it does what it says it does. This means, as Richard C. Buetow, Motorola Director of Corporate Quality, has said with only slight exaggeration:

With ISO 9000 you can still have terrible processes and products. You can certify a manufacturer that makes life jackets from concrete, as long as those jackets are made according to the documented procedures, and the company provides the next of kin with instructions on how to complain about defects.

### Nationalization vs. Globalization

Many of the companies DoD selects as contractors are global, not just multi-national. They truly are, as one Ford executive indicated, a collection of little companies operating under one name. In this shift to globalization, international boundaries assume a seamless character, leading to an issue of nationalization versus globalization. Companies are beginning to question, given that ISO 9000 is becoming a global standard, whether national bodies should be the players creating the standard. They are asking who the real players should be; perhaps the global companies themselves.

It is also uncertain at this time whether the former Eastern Block, Russia, Japan, China, and other Pacific Rim countries will all come on-board with ISO 9000, or if we will see some sort of standards war coupled with resultant trade wars. The United States is trying to circumvent this possibility through programs administered by the National Institute of Science and Technology (NIST). As a result, NIST has established successful pilot programs in Saudi Arabia, and has proposed a similar program for Russia.

### The Latest Fad or a Quest for Market Advantage?

The impetus for ISO 9000 certification is still confused. Many managers rushed immediately for ISO 9000 certification, just as they have grasped for every other quality initiative that has come along; everything from Total Quality Management (TQM) to Statistical Process Control, Deming, Juran, Crosby, Zero-Defects, and others. It is not the quality they seek, but the perceived market advantage signified by

the certification. It is the paper they want to hang on their wall, not development of quality products for their customers.

What is seen by many as just the latest fad, is also seen by others as a ticket into the European Union (EU), formerly known as the European Community (EC). In fact, it is true that some EU companies will not do business with companies who are not ISO 9000-certified. However, in spite of this apparent acceptance, the stark reality is that companies are often looking for ways to avoid the costs of repeated audits of suppliers, or are using the certification as a trade barrier of sorts, or both. The presumed acceptance of ISO 9000-certified companies into the EU marketplace has been hampered by the nationalistic motivations of the member countries, which in turn has emasculated the reciprocal agreement process that should have been firmly established two years ago.

The long-term anticipated effect is that as companies rush to become certified, and as the body of certified companies becomes very large, the market advantage of certification will disappear and contracts will be awarded on cost as the primary driver, not product quality. The impetus for certification may, in fact, already be losing steam. An Amsterdam polling firm, Inter/View, surveyed 423 companies representing a statistical universe of 80,000. Of the small businesses responding, only 27 percent considered the ISO 9000 certification a business requirement. These 27 percent gave, as their reason for pursuing certification, customer demand or market advantage, not product quality. Of the large businesses surveyed, 49.7 percent cited customer demand, and 37.2 percent cited marketing advantage.

The intent of the standard – product quality – has been overshadowed by the perceived market advantages of certification. The result is that small companies complain of bearing the cost, and others are advising companies to hold off on certification. Dean

# ISO 9 Assurance

Why was the International Standardization Organization (ISO 9000) series developed? In a shifting global market, both domestic and international companies found themselves required to meet many quality standards for different countries that were conflicting, in different measuring units and management systems that were usually quite confusing.

As part of its strategy to meet this and other geo-political economic challenges, the European countries agreed to form a European Community (EC). From the outset, the EC needed acceptable Quality System Standards for products and services for their customers and suppliers. The ISO, seeking to eliminate some of the confusion, convened to develop an international quality system standard.

In 1985 they agreed on a Resolution that all products produced and sold to the public for which an ISO directive was written, would conform to the quality system standards of the ISO, and be duty-free for acceptance throughout the EC. The ISO 9000-series standards were subsequently issued in March 1987, and covered the essential requirements for good and efficient business management.

The technical specifications included in the ISO 9000 series were not mandatory, nor were they very specific in application

# 00 International Quality Standards – A Brief History

JULIUS HEIN

and implementation. Maintaining certification to the specifications was also not mandatory. Manufacturers, in essence, were given two choices. They could either:

- conform to the ISO 9000 directives; or
- prove that their products conformed to the essential quality method requirements.

The ISO 9000-series standards have since become the most accepted and used standards in the world. The EC mandated that industries actively engaged in health, public safety, and environmental issues possess certification to the ISO 9000-series standards, as determined by industry-specific directives. Many customers now push industries to become certified. The ISO 9000 series consists of five parts:

## ***ISO 9000, Quality Management and Quality Assurance Standards — Guidelines for Selection and Use***

When a business desires to apply for ISO registration, this document provides guidelines as to which document to use and how to use it. A business can apply and register under ISO 9001, ISO 9002, or ISO 9003, depending on the nature of its business structure.

## ***ISO 9001, Quality Systems — Model for Quality Assurance in Design/Development, Production Installation, and Servicing***

This is the most complete model for quality assurance systems. The 20 quality system elements listed below are the 20 mandatory requirements of the standard. ISO 9001 is for businesses that include the design function of the product after the sale.

- |             |   |
|-------------|---|
| Section 4.1 | Management Responsibility               |
| Section 4.2 | Quality System                          |
| Section 4.3 | Contract Review                         |
| Section 4.4 | Design Review                           |
| Section 4.5 | Document Control                        |
| Section 4.6 | Purchasing                              |
| Section 4.7 | Purchaser — Supplied Product            |
| Section 4.8 | Product Identification and Traceability |
| Section 4.9 | Process Control                         |

- |              |  |
|--------------|--|
| Section 4.10 | Inspection and Testing                     |
| Section 4.11 | Inspection, Measuring, and Test Equipment  |
| Section 4.12 | Inspection and Test Status                 |
| Section 4.13 | Control of Non-conforming Product          |
| Section 4.14 | Corrective Action                          |
| Section 4.15 | Handling, Storage, Packaging, and Delivery |
| Section 4.16 | Quality Records                            |
| Section 4.17 | Internal Quality Audits                    |
| Section 4.18 | Training                                   |
| Section 4.19 | Servicing                                  |
| Section 4.20 | Statistical Techniques                     |

## ***ISO 9002, Quality Systems — Model for Quality Assurance in Production and Installation***

This standard is to be used when conformance to specified requirements is to be assured by the supplier during production and installation. It also includes the final inspection and test requirements of ISO 9003 and adds the servicing element from ISO 9001.

## ***ISO 9003, Quality Systems — Model for Quality Assurance in Final Inspection and Test***

This standard is to be used by the supplier only for final inspection and test. Certification to this standard is not widely used.

## ***ISO 9004, Quality Management and Quality Systems Element — Guidelines***

Along with ISO 9000, ISO 9004 is also an advisory document. This standard is a handbook for implementation of quality management and the quality system elements. The implementation of the guidelines in ISO 9004 is not mandatory for certification. The standard provides detailed advice to businesses on how to manage the overall quality system elements given in the ISO standards. It also provides detailed advice on the intent of elements listed in ISO 9001, 9002, and 9003. ISOs 9004-1 and 9004-2 were published in 1993: ISO 9004-1 explains the ISO 9000 series for manufacturing, while ISO 9004-2 explains the standards for the service companies.

**Editor's Note:** Hein is the Director, Central Region, DSMC. He holds a B.M.E. from Ohio State University, an M.S. from the University of Missouri at Rolla, and a D.P.A. from Nova University. He is a registered Professional Engineer and a Professional Engineering Manager.

Beachler, chairman of the National Tooling and Machine Association standardization committee said, "ISO 9000 is not necessarily a ticket to exporting, nor is lack of certification proving to be as much a detriment as earlier supposed. It isn't true you need ISO 9000 absolutely to compete globally, and we can offer up thousands of examples."

### **Quality Reality or Quality Scam?**

On closer examination, another agenda surfaces. The rush toward ISO 9000 certification has been ostensibly to gain access to the EU market. This may, in fact, have been the prime motivation for many companies. However, when the veil is pulled back, another picture emerges. The ISO certification process is very costly and time-consuming. Many American companies have come to the conclusion that the ISO 9000 certification requirement is more a trade barrier than anything else. Little value-added is seen by achieving certification, and many companies are now taking a second look at this whole thrust.

Although it was touted as the means to open up the EU market to American and other non-EU companies, the European Commission (EC) official in charge of quality policy, Antonio Salve Mendes, has indicated otherwise. He wrote a 10-page report entitled, "Elements of a Community Quality Policy." In this report, Mendes noted that in spite of the widespread acceptance of ISO 9000 by European companies, those companies still lag the Americans and Japanese in product quality. He wrote, "There is one thing which our competitors...(particularly Japan and the United States) are handling effectively: quality, in the broadest sense of the word." One must therefore ask, if the EU is concerned about product quality from the European companies, and if they acknowledge the higher quality of products from their competitor countries, then why would they be so eager to open the EU market to products of American and Japanese companies, when the quality of those products is so clearly superior?

Is ISO 9000 certification quality reality, or is it a quality scam? Why are the EU countries staying with ISO 9000 if it is not producing a quality advantage for the EU companies? Time will tell. I can say from personal experience, having participated on a Technical Committee (TC) to produce an ISO standard, the TC members representing the different nations are very reluctant to incorporate any requirement into an ISO standard that their nation will have difficulty meeting. Individual national interests drive the content. Therefore, the requirements are a minimal set, which all the national representatives agree should be the content.

### **EC — Stepping Back and Changing Direction**

The EC has also taken steps recently to downplay the importance of ISO 9000 certification. Recognizing that the ISO 9000 certification process has become big business, and that the whole system reeks with conflict of interest and the potential for fraud, and that it is the certification and not product quality that has become the focus of attention, the EC is taking a step back and changing direction — a move that is causing the ISO itself to gasp in disbelief.

The EC is advocating a shift in emphasis to quality products and processes and away from certification. The whole industry that has grown up around the certification process — the consultants and trainers who have been making huge sums in what some describe as an ISO 9000 feeding frenzy — are now looking at the possibility of their whole business basis going down the tubes almost overnight.

It is significant to note that those who are pushing hardest for ISO 9000 certification, and who are creating the most pressing arguments of a fear-based need for certification, are the companies who do the certifying, not the governments or customers. Supplier companies are beginning to complain about non-certified customers requiring certification of their suppliers, presumably to avoid having to

conduct regular supplier audits. This new EC thrust has taken shape as described in Mendes' report, "Elements of a Community Quality Policy," cited previously in this article. This report calls for "creation of a pan-European quality program uniting the public and private sector. Although the ISO 9000 standards would be used as a basis for the program, the ISO 9000 certificates would be de-emphasized."

### **Exceeding ISO 9000 Requirements**

Leading American companies have recognized their quality leadership for some time. They have acknowledged that ISO 9000 offers nothing in terms of value-added, and that their quality assurance systems currently in place far exceed the ISO 9000 requirements. Boeing Commercial Airplane Company, for example, does not accept ISO 9000 certification as sufficient to be classified as a Boeing supplier, but has indicated the certification does help in passing the Boeing Basic Quality System evaluation. Those companies who are already Boeing suppliers are not affected by the ISO 9000 registration emphasis. They have already passed evaluation criteria considerably more stringent than ISO 9000 requirements.

### **Disincentive to Improve a Decided Drawback**

One of the least understood drawbacks of the ISO 9000 certification process is the built-in lack of incentive to improve, or more particularly, the disincentive to improve. It is not immediately evident, but according to the way the ISO 9000 certification process is set up, a company that reaches certification receives a certificate that is good for three years. After three years it must be completely recertified. In the interim, the company is checked every six months. But the real concern is that once the company processes are certified, "if a company changes a specific process, it will have to be certified...discouraging attempts to change or update existing processes."

In short, a company committed to ISO 9000 certification may find itself

unable, due to the recertification and interim review costs involved, to implement a continuous improvement program that affects existing certified processes. The result is the death of any entrepreneurial initiative the company may have had.

### **ISO A Quality Lowest Common Denominator?**

Another result of reliance on ISO 9000 certification will be less tendency on the part of the customer to exercise quality oversight of suppliers. Recognizing that ISO 9000 establishes the minimally acceptable criteria, meeting ISO 9000 requirements does not say very much for superior quality. In fact, even with full compliance and with all good intentions on the part of those implementing ISO 9000, the standards offer little other than a quality lowest common denominator.

Certification also tends to cause ignorant customers to award supplier contracts, largely on the basis of cost, to certified companies. This will become commonplace if the majority of companies become ISO 9000-certified and the certification ceases to provide the market advantage it once did. If three bidders are all ISO 9000-certified, the tendency will be to award the contract to the lowest cost bidder, largely based on the unrealistic assumption of what the ISO 9000 certification really signifies in terms of product quality.

This lowest cost award tendency is a potential reality within DoD as well as the DoD contractor community, unless it is well understood by the acquisition community at all levels that ISO 9000 certification is by no stretch of the imagination synonymous with high product quality. Therefore, there will be a double-whammy against which DoD will have to protect itself: no incentive for process improvement on the part of contractors, and a tendency on the part of DoD procurement officials to award contracts based on cost because of presumed levels of product quality guaranteed by the ISO 9000 certification of contractors.

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brains.*

### **Current Process a Significant Departure from Initial Conception**

The ISO 9000 certification process is hardly conducted in the way it was originally intended. The original thought, and the current assumption of many, is that an American company, once certified, will have automatic entry into the European market. That is how it was intended to work, but is not how it does work. One player in this field likens the ISO 9000 certification process to the Wizard of Oz being able to give the scarecrow his brains.

Companies who are crowned with the certification have usually paid large sums for an outsider with dubious qualifications to tell them what they already knew about what they already had in their quality process. What is worse, the certification may be meaningless in Europe. Instead of the certification being accepted generally in the EU as was the original intent, it has become nationalized, and the certification granted by a given registrar may be accepted by only one country in the EU, or even none.

Mutual recognition agreements between the EU countries have not been signed, so a registrar considered acceptable by Britain, for example, may not be accepted by France or Germany. Recognition agreements between the EU countries and the United States are even farther away. A company that has acquired certification from a registrar recognized by Britain may have to seek recertification, with all of the attendant costs, from other properly recognized registrars, to operate in France or Germany. This is in addition to the situation where, "there is a 60- to 70-percent, first-time failure rate" for those seeking certification.

Small companies are clearly at a major disadvantage, and are in many cases being pushed to obtain certification by large companies who are not themselves certified. Clearly, the interest is not product quality, but rather reduction in acquisition costs due to the presumed need for fewer supplier audits. The responsibility for quality is shifted to the ISO 9000 certification process, not retained by personnel in the companies producing the product or acquiring the product.

### **Lack of Regulation of the Certification Process**

Another problem is the lack of regulation of the certification process. To begin with, instead of a general recognition of registration among EU countries, as was the original intent, each individual country has been obligated to appoint a recognized body to be the regulator of ISO 9000 registrars, and the requirements differ from country to country.

Companies that are focused on the certification itself and have not done their homework can easily select a registrar not accepted by any country. Companies that are global and do business in many countries may have to incur the registration costs for each EU country in which they intend to operate. This virtually eliminates small companies altogether from participation in the market.

Each registrar interprets the standard without any governance to determine if their interpretation is valid. A major complaint with the standard is vagueness, and the lack of specificity means that companies are at the mercy of the registrar, registrars being the only ones authorized to interpret the standard. A common complaint of companies is the wide variance of interpretation by different registrars.

In the United States, the government has not appointed a licensing agent, opting rather to let the American Society for Quality Control (ASQC) establish the Registrar Accreditation Board (RAB). The RAB, although in existence for over three years now, has still not received the desired consensus approval from the EC, leaving a cloud over the heads of the RAB-certified registrars.

To complicate matters, many registrars in the United States do not receive registration by the RAB, but rather by licensing bodies in other countries. To make matters even worse, in the United States, “an organization (or person) can simply declare itself a registrar – a situation that is legally prohibited in Europe.” The problem is further complicated by the consulting side of the picture. Most companies hire a consultant to help them get ready before the registrar comes in for the audit.

Although the certification process for registrars is lax, the process for consultants is nonexistent. Anyone, with no qualifications at all, can advertise that they are an ISO 9000 consultant, and in today’s market will probably have many clients. In 1993, the National ISO 9000 Support Group conducted a survey of 660 ISO 9000 consulting firms, and found that only 111 of those had any formal assessment training.

## **Certified Public Accountants and ISO 9000**

Finally, to further complicate the matter there is a big push on among Certified Public Accountant (CPA) firms to become ISO 9000 registrars and con-

sultants. They reason that since their job is auditing, and the ISO 9000 certification process is an audit process, they should be eminently qualified for this task. No mention is made of subject-matter expertise or domain knowledge within a given subject area. To these proponents, an audit is an audit, and it represents a large potential source of income, especially from ignorant potential customers.

In my opinion, to allow a CPA firm to conduct a certification on a defense software contractor, and then award a weapon system software contract based on that certification, or give any credence to that assessment, is tantamount to playing contractual Russian roulette. Simply stated, CPAs do not generally have the subject-matter expertise to provide the kind of assurance needed by DoD, where the software is going to provide the functionality for weapon systems on which our fighting forces are going to risk their lives. It may be a large potential source of income for a CPA firm, but I do not think it is worth the risk to DoD to rely on such an assessment.

## **Let's Look at the Whole Picture**

Given all that, we need to assess where we are in DoD and what we should be requiring of our software development contractors. From the above, it might sound like ISO 9000 is not the answer, at least not for software. The real answer is, it depends. We need to look at the whole picture, and when we do we see that there may be a place for ISO 9000-compliant companies in the software acquisition process, not because of certification but because of what they have done to comply with ISO 9000 quality requirements. The certification itself is something DoD should de-emphasize.

It is important to look at the issue from three different perspectives. One is the ISO 9000 standard; another is the Software Engineering Institute (SEI) Capability Maturity Model (CMM); and the third is the Malcolm Baldrige National Quality Award criteria.

**SEI Model.** It makes sense to begin with the SEI model since this forms a sort of hub within which the other two can be seen to fit, and in relation to which each of the other two makes some sense. The SEI, a federally funded research and development center located at Carnegie-Mellon University in Pittsburgh, was tasked by DoD with determining why some companies seem to consistently be able to produce good software, while the performance of others, the majority, was totally unpredictable.

**Capability Maturity Model.** The SEI conducted a major research task, which resulted in the publication of the Capability Maturity Model. The CMM shows that the key to production of good software is institutionalized good processes, not individual skills, and that there are specific processes that must be incorporated.

Further, they found that the processes have a hierarchical dependency. This means that it is not enough for a company to develop the correct processes, but that they must develop those processes in a hierarchical order if the desired benefits are to be derived. The process maturity is evaluated on a scale from one to five, now designated by name rather than number.

**Level 1.** What the SEI found was that companies at Level 1, the Initial level, operate in an ad hoc manner, and have no process dependency.

**Level 2.** Companies at Level 2, the Repeatable level, have institutionalized four processes. Those are Project Management, Project Planning, Software Quality Assurance and Software Configuration Management.

**Level 3.** Companies at Level 3, the Defined level, must have institutionalized, in addition to all the processes at Level 2, the four additional processes of Training, Peer Reviews, formation of the Software Engineering

Process Group, and establishment and institutionalization of internal Software Standards and Procedures.

**Level 4.** Companies at Level 4, the Managed level, must demonstrate the institutionalization of the two additional processes of Product Quality Management and Process Measurement and Analysis.

**Level 5.** Companies at Level 5, the Optimized level, must demonstrate the additional processes of Process Improvement and Defect Prevention.

What has all this got to do with DoD software development and ISO 9000 certification? When the SEI did their initial analysis of the DoD contractors, they found that almost 87 percent were at Level 1; in 1992 they found that 81 percent of the companies surveyed were still at Level 1, and slightly over 1 percent were at Level 3. Only three projects, not facilities, in the world are managed at Level 5. Two of these are in the United States. One facility, Motorola-India, was recently assessed at Level 5.

This picture means that there is a high likelihood of a Level 1 software company being awarded a contract, and this presents an extremely high risk to the DoD program manager. There are simply not enough Level 3 and 4 companies to go around. However, if the ISO 9000 standard is invoked, not by requiring certification, but by requiring that the software processes included be implemented and used in conjunction with Mil-STD-498, this would result in a process maturity equivalent to a high Level 2 – one which is approaching Level 3 maturity. This could be very important because under the current system of acquisition, DoD cannot require a particular SEI level of maturity of the contractor. The lower the maturity level, the higher the risk; the higher the maturity level, the lower the risk.

*The Malcolm Baldrige criteria are generally those that focus on process maturity, customer satisfaction, process measurement and control, top management involvement and commitment, and other types of criteria that one would expect to see at the higher levels on the SEI maturity scale.*

This could be the impetus many companies need to begin to improve their process maturity and lower the risk to the government acquisition community. Note that ISO 9000 certification is not the issue here, but rather invoking the quality process requirements of the standard. Certification is irrelevant. The fact that the processes have been implemented should be established by a pre-award audit conducted by the government, not by a registrar with dubious credentials.

Hughes Aircraft in Fullerton, California, spent \$450,000 over two years to go from SEI Level 2 to Level 3. However, they determined that as a result of that one-time investment to reach Level 3, they were saving approximately \$1.2 million dollars annually thereafter. This is in contrast to the ISO 9000-required investment of approximately \$250,000, and the three-year average period to recover that investment.

**Malcolm Baldrige National Quality Award Criteria.** If DoD desires to go beyond Level 2, however, and many

program managers feel it would be a significant advantage to have a contractor at a solid Level 3, then it is moving into a maturity level sphere where ISO 9000 falls by the wayside. What begins to surface at Level 3 through 5 is a maturity consistent with the requirements generally expressed in the Malcolm Baldrige award criteria.

Several software development companies that have applied for the Malcolm Baldrige award have described their adoption of the SEI maturity model as the means chosen to improve their software quality process. While parts of the individual Baldrige criteria generally change each year, the required level of process quality maturity necessary to meet the objectives stated is fairly consistent.

The Malcolm Baldrige criteria are generally those that focus on process maturity, customer satisfaction, process measurement and control, top management involvement and commitment, and other types of criteria that one would expect to see at the higher levels on the SEI maturity scale. The Malcolm Baldrige criteria are much broader than the ISO 9000 criteria, and offer more in the way of overall contractor maturity.

This means that if DoD desires to contract with companies to develop software for weapon systems, intelligence systems, command and control systems, and other complex systems; and a process maturity at SEI Level 2 or a little higher is desired, the ISO 9000 standard requirements might be an appropriate option to consider, provided the focus is on the content and not on certification, and provided the government or a properly qualified agent performs the pre-award audit.

### **Internal Standards Equal or Better**

We must also be willing to step back and recognize there is nothing inherently wrong with current systems developed by leading contractors under the guidelines of DoD-STD-2167A, or systems based on TQM or

continuous process improvement. Just because a new initiative has come along in ISO 9000 does not mean the other existing systems are deficient. Many multinational companies, such as Boeing, developed internal standards based on the military standards, and then sought to improve the standard even further as their software development processes matured.

Even if DoD-STD-2167A and DoD-STD-2168 are not available any more, the software development systems of contractors based on these standards, and improved upon over the years, are still good systems, and are commercial systems. If a company offers to use such an internal system, it should be acceptable to DoD. However, it will require sufficiently knowledgeable government evaluators to determine the suitability of the contractor system during pre-award audits.

### **Mil-STD-498 and Its Commercial Equivalent**

One more consideration affects this picture. At the beginning of this article, I indicated that the PAT<sup>3</sup> had recommended that Mil-STD-498<sup>4</sup> not be issued. Since that time, several people became concerned about the effect of not having an adequate software development standard for DoD weapon systems. The Defense Science Board expressed concern, as did the Software Management Review Board (SMRB), with this situation.<sup>5</sup>

At the SMRB meeting in September of 1994, chaired by John Burt, the Deputy Undersecretary designee, this concern was expressed, and the SMRB took responsibility for getting Mil-STD-498 signed out as a process standard. Upon issuance of the standard, the Institute of Electrical and Electronics Engineers (IEEE) issued a Project Action Request to develop a commercial equivalent standard. As soon as this IEEE standard is issued (targeted for July 1996), Mil-STD-498 will be deleted. The DoD will then invoke the new industry standard on contracts. Mil-STD-498 was signed out and made available to all parties con-

cerned. The Navy and Air Force have issued blanket waivers to use Mil-STD-498, but the Army has not, thereby further complicating the picture, especially for joint programs.

### **Other Developments Complicate the Issue of a Replacement Standard**

Since the time Mil-STD-498 was signed out, other developments have come about that add a layer of complication to this picture. The intended IEEE replacement standard, IEEE-STD-1498, may not be issued. The most current objective is to focus attention on issuing ANSI-STD-016, which will be ISO-STD-21207, Software Life-Cycle Management,<sup>6</sup> as is, with a USA-tailored annex. This annex will contain much of the good technical content of Mil-STD-498.

This new standard, ANSI-STD-016, will probably not be issued until December 1996. If successful, then IEEE-STD-1498 will not be issued. It is also anticipated that ISO 9000-3 for software will have one minor revision and then will be canceled in favor of ISO-STD-21207. This is one more major reason not to rely on ISO 9000 certification for software contractors.

### **Why All the Fuss?**

One might wonder, why all the fuss over ISO 9000 if Mil-STD-498 is signed out and will eventually be replaced by an equivalent industry standard. Similar in scope to DoD-STD-2167A, Mil-STD-498 focuses much more on process. The standard requires that a contractor have documented processes covering software development, software quality assurance, configuration management, and the like, but still emphasizes the documentation and products to be delivered.

As long as they are tailored properly so as not to create a conflict between them, I would consider invoking both Mil-STD-498 and ISO 9000-3 for as long as ISO 9000-3 survives, especially if the program is a large joint program, and definitely where any European

companies or countries will be involved. But again, I would not impose any requirement for certification; just compliance under the contract with the requirements of the standard. The government, as the customer, can be the best interpreter of the standard for its contract purposes. Upon issuance of ANSI-STD-016, the issue is considerably simplified.

### **DoD and the Malcolm Baldrige Criteria**

One more point needs to be addressed regarding this whole ISO 9000 certification question. I have repeatedly indicated in this article that certification is not the issue, but rather compliance with the product quality objectives. Accordingly, DoD should begin to focus more on the Malcolm Baldrige criteria, and begin to invoke these criteria on contracts. Naturally, this could not be done all at once. The Malcolm Baldrige criteria, as a collective set, are those met by very few companies. But the criteria could be introduced a little at a time and made a part of the acquisition source selection criteria.

Over time, the entire set of criteria could be incorporated, tailored of course for the needs of individual programs. Since the Malcolm Baldrige criteria are at a considerably higher process maturity level than ISO 9000; and if our desire is to have companies continue to improve processes and become more mature; and to have top management in companies become more committed to product quality, it seems natural that we would gradually begin to invoke the Malcolm Baldrige criteria.

It would clearly be an advantage to DoD to have companies operating in compliance with the Malcolm Baldrige criteria, and would certainly give American companies a competitive advantage both here and abroad, an advantage not enjoyed by mere ISO 9000 compliance, certified or otherwise. If the Malcolm Baldrige criteria were gradually introduced into the DoD acquisition process, it would spur foreign companies doing

business with DoD to improve their processes both in depth and in scope.

It would soon become obvious that a company which is Malcolm Baldrige-compliant is clearly operating at a level considerably higher than that required by ISO 9000, and should not be required to have ISO 9000 certification. If the United States was to require such compliance of foreign companies operating in the United States, the U.S. reputation for quality would soar much higher than it ever could under ISO 9000 compliance requirements. To do this, however, a DoD-tailored process for evaluation has to be devised.

### **As I See It**

Having taken several pages to tell you that the fundamental answer to the question posed in the opening paragraph of this article is "No," I will try to outline for you what should be done.

- The ISO 9000 standard, particularly ISO 9000-3, should be invoked on software development contracts, without any regard whatever for whether a bidding company is or is not certified.
- The Mil-STD-498 should be invoked on all software contracts, regardless of whether they are weapon systems development contracts or contracts for management information systems, and the Army should be encouraged to adopt this standard. The standard was designed to be used for development of both types of systems. Naturally, the standard must be tailored for use in accordance with the needs of the contract.
- Specific metrics should be invoked so that adequate visibility into the development process can be obtained during each life cycle phase by both the government and the contractor program managers, without being an undue burden on the personnel producing the prod-

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- ANSI-STD-016, once issued, should be used in place of the ISO 9000-3 and Mil-STD-498 standards.

As the acquisition process is modified under the acquisition reform initiative currently underway, consideration should be given to begin incorporating the Malcolm Baldrige criteria as part of the source selection process. This will have to be done gradually over time. If done properly, it should drive the contractor and government community toward higher quality processes across the board, and should eventually serve as the major discriminator in contract award and a major requirement for joint programs and for multi-national programs.

**Editor's Note:** Dobbins welcomes questions or comments concerning the issues and recommendations surfaced in this article. He may be contacted as follows:

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### **E N D N O T E S**

1. Memorandum from William J. Perry, Secretary of Defense, "Specifications and Standards - A New Way of Doing Business," June 1994.
2. Report of the Process Action Team on Military Specifications and Standards, April 1994, issued by the Office of the Under Secretary of Defense for Acquisition and Technology.
3. Ibid.
4. Memorandum from R. Noel Longuemare, Principal Deputy Under Secretary of Defense for Acquisition and Technology, "Report of the Defense Science Board Task Force on Acquiring Defense Software Commercially," July 26, 1994.
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# University of Texas at Austin Conducts Orientation Session at DSMC

## Science and Technology Commercialization Graduate Degree Now Offered at DSMC's Fort Belvoir Campus

COLLIE J. JOHNSON

**O**n December 16, 1995, Col. William E. Knight, USA, extended an enthusiastic and long-awaited welcome to the first candidates for the University of Texas at Austin (UT-Austin) graduate degree in Science and Technology Commercialization. Knight, the Dean of College Administration and Services at DSMC's main Fort Belvoir campus, was joined by representatives of UT-Austin and the DSMC Commandant. Together, they conducted the first Virginia Orientation Session for students enrolling in UT-Austin's Science and Technology Commercialization Masters Program, which began classes on January 26, 1996.

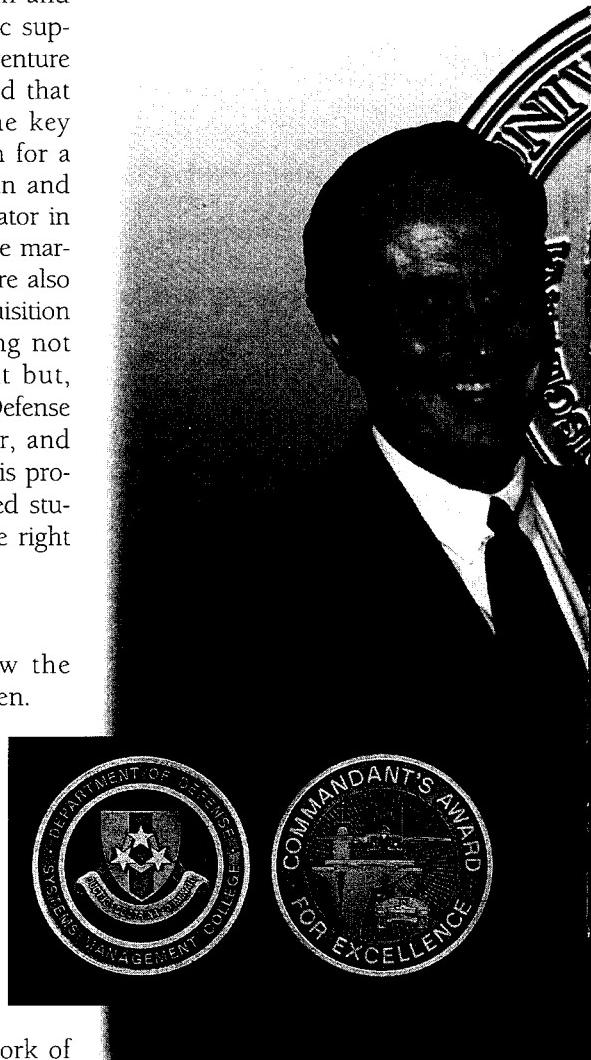
### Making It Happen

This mutually beneficial educational partnership was preceded by months of rigorous preparation and restructuring on the part of UT-Austin and DSMC. Realizing that a critical core of technology managers in the Washington, D.C. area could benefit from such a program, UT-Austin and DSMC developed and structured the curricula, schedule, and facilities so that students could remain on the job while pursuing a graduate degree in Science and Technology Commercialization. Of special note is the fact that this is the first degree program UT-Austin has offered totally outside the state of Texas.

After two years of work, Knight and his staff pulled together many of the legal, logistical, and administrative details to make the new educational partnership between UT-Austin and DSMC a reality. An enthusiastic supporter of this joint educational venture from the onset, Knight stressed that "partnership" was indeed the key word. "This is a perfect match for a partnership between UT-Austin and DSMC because UT is an innovator in trying to bring technology to the marketplace quickly. We [DSMC] are also innovators in assisting the acquisition reform effort, which is helping not only the federal government but, specifically, the Department of Defense to work better, smarter, faster, and cheaper...you're here to learn this process," Knight told the assembled students, "and you've come to the right place."

### A Dream Come True

"A dream come true" is how the DSMC Commandant, Brig. Gen. Claude M. Bolton, Jr., USAF, described the UT-Austin/DSMC educational partnership. "From the beginning when Bill Knight and I first looked at the proposal, it sounded like a great idea, because a lot of folks in this area want to know how to do this type of work. And thanks to UT Austin, and the hard work of



Johnson is Managing Editor, Program Manager, DSMC Press.

Bill and his staff, you, our students, now have the opportunity to take this important step in achieving your graduate education goals. You are the reasons that we've worked so hard over the last couple of years to make this educational partnership happen."

Bolton went on to say that, "We [DSMC] look at this as a grand opportunity for the College, working with UT-Austin, to bring the business of technology and commercialization, together with the latest in learning theories and classroom equipment, to your learning experiences on this cam-

pus." He had generous praise for UT-Austin, Knight and his staff, calling their joint cooperation "key to bringing this graduate program altogether for all of you." Referring to the increased importance of dual use-technology and how to get it to the marketplace, he commended UT-Austin for being at the forefront educating the professional acquisition workforce in this vital acquisition reform initiative.

Introducing Dr. Robert S. Sullivan, Director, IC<sup>2</sup> Institute, UT-Austin, Bolton presented him with a brass coin — the DSMC Commandant's

Award for Excellence. Reciprocating, Sullivan presented Bolton with one of the first UT-Austin/Fort Belvoir T-shirts, commenting, "It's one of the shirts that hopefully many of our students also will wear to remember that they're part of a new group, an experiment, changing the learning processes in higher education."

### About the IC<sup>2</sup> Institute

The Science and Technology Commercialization graduate degree program has deeply embedded roots in UT-Austin's IC<sup>2</sup> Institute. Sullivan first gave an overview of the Institute's framework. The Institute's acronym stands for "Innovation, Creativity, and Capital." It was founded by Dr. George

Kozmetsky, who had previously co-founded Teledyne Corporation — the large, multi-national, multi-business industry, with strong ties to the defense industry technology base.

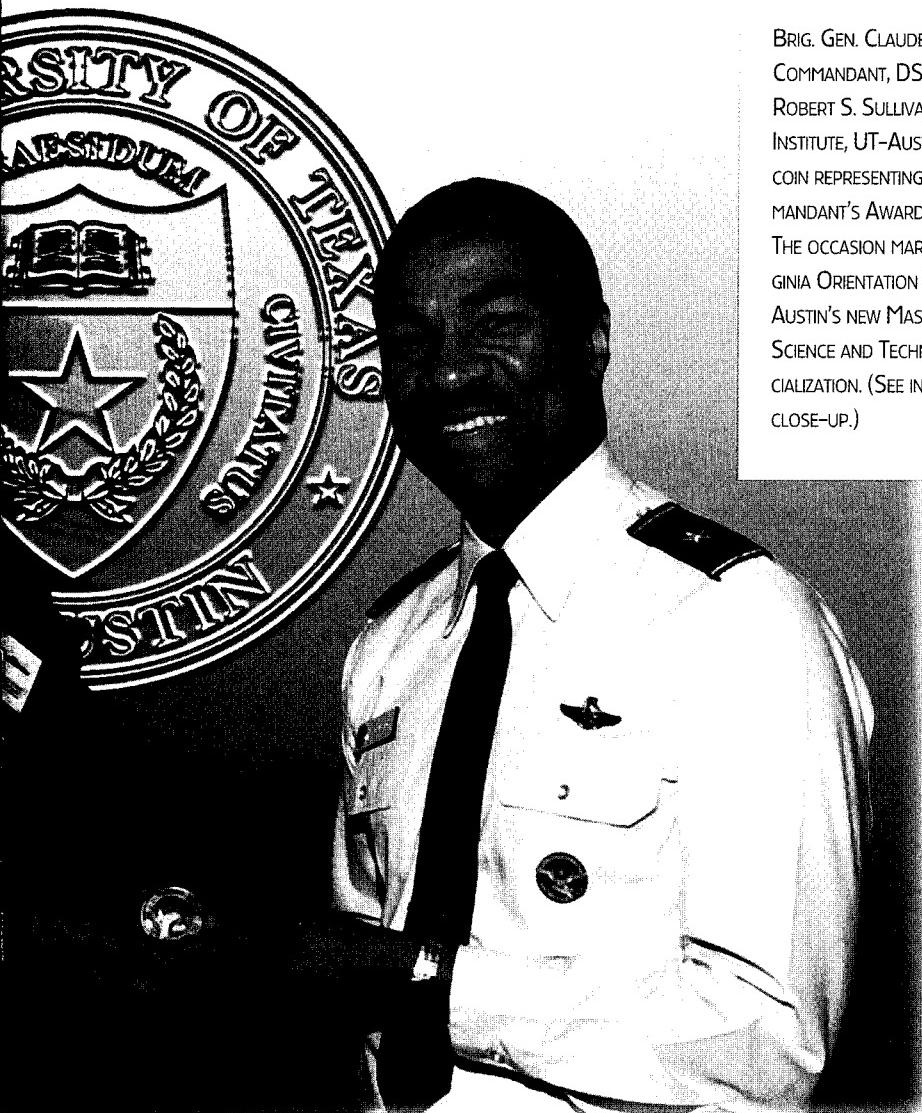
BRIG. GEN. CLAUDE M. BOLTON, JR., COMMANDANT, DSMC, PRESENTS DR. ROBERT S. SULLIVAN, DIRECTOR, IC<sup>2</sup> INSTITUTE, UT-AUSTIN, WITH A BRASS COIN REPRESENTING THE DSMC COMMANDANT'S AWARD FOR EXCELLENCE. THE OCCASION MARKED THE FIRST VIRGINIA ORIENTATION SESSION OF UT-AUSTIN'S NEW MASTERS PROGRAM IN SCIENCE AND TECHNOLOGY COMMERCIALIZATION. (SEE INSET FOR COIN CLOSE-UP.)

Kozmetsky, seeking to parley his past successes and profits taking knowledge from the laboratory to the marketplace, plunged those assets into establishing the IC<sup>2</sup> Institute 17 years ago. As the IC<sup>2</sup> Institute Director, he looked at many issues including venture capital and start-up firms.

"The IC<sup>2</sup> Institute," said Sullivan, "is now more than UT-Austin. In fact, its programs span the United States in terms of our activities within the Institute. And one very important piece of the Institute is the Master of Science Degree in Science and Technology Commercialization, which we're now focusing on. Ultimately, you'll realize that it's at the core of what we do."

### Austin Technology Incubator

Another important piece of the Institute's success, according to Sullivan, is



its Austin Technology Incubator, which basically takes knowledge out of the laboratories, commercializes that knowledge, and sets up companies. Currently, the Institute has about 29 companies in its incubator; only two have failed.

"Our easy access to support structures and other infrastructures necessary for launching these companies has been critical." Sullivan went on to say that in Austin, the UT-Austin Technology Incubator has directly created between 800 and 1,000 jobs that are technology-based and high-paying. And the multiplier effect for that in terms of other related jobs is very significant for the community. "In fact," he acknowledged, "two years ago, the Austin Technology Incubator was named the top incubator in the United States."

### **But That's Not All**

Sullivan continued his discussion of the Institute with a recap on the amazing array of projects and services originating from the Institute. Among them:

**Capital Network, TCN.** This is a "matching mechanism" where the Institute matches wealthy individuals looking for investment opportunities with a technological industry suited to their capital, risk, and other parameters. This Network has now become the largest of its kind in the United States, very successful, and completely self-sustaining. *Forbes*, *Fortune*, and *Business Week* have published articles highlighting the Network's successes.

**Technology Commercialization Centers.** The National Aeronautics and Space Administration was the Institute's first experiment outside of Austin to bring the technologies in, provide the best technology for the market, provide an infrastructure and support, and increase the likelihood of the company's success. The commercialization process is now growing so rapidly that, according to Sullivan, the Institute could double its size and still not satisfy all the demand. Centers are

evolving all across the country including Johnson Space Center, Houston, Texas; San Jose, California; Charleston, South Carolina; and Bechtel, North Las Vegas, Nevada.

**Global Alliances.** The Institute plays a role networking commercialization processes and procedures around the world. Its horizons extend from working military defense processes in the Ukraine, to sharing technologies and processes in Cuba, to incorporating software companies in Brazil into the Austin Technology Incubator.

**Telecommunications.** The Institute recognizes that the processes of communicating and learning are changing drastically. The goal is to distribute learning worldwide; provide individuals with the right knowledge when they need it and where they need it; customize the information for customers; and maintain a mutually satisfying partnership with customers and institutions.

**Conferences, Seminars, Executive Programs.** The Institute runs conferences, seminars, and executive programs all over the world, including Russia and China, as well as major cities in the continental United States.

### **Focus for Tomorrow**

Sullivan then outlined for the assembled students exactly what the Institute's focus would be during their graduate education:

**Continual Transforming Process.** "Focus on not only what skills are necessary today to carry out our jobs, develop a foundation or a process so that we're continually transforming ourselves – not only trying to *keep up* with change, but actually *causing* change. We want to be at the *forefront*."

**Research, Discovery, Dissemination.** These three areas are a vital part of the Institute's mission. Research and discovery focus on the laboratory process – what it takes to be more successful in the process of commercializing sci-

ence and technology. How do we do it better? What would build a better infrastructure? "It doesn't do us any good to discover something," said Sullivan, "if we're not getting the information out." And that is where dissemination enters the picture. The bottom line, according to Sullivan, is if a discovery does not go into the market [dissemination] and society does not benefit, no wealth or prosperity sharing results. Sullivan stressed that the Institute wants to create social and cultural enrichment. And to achieve that end, all three processes – research, discovery, dissemination – are inseparable.

Summarizing his presentation, Sullivan told the students the Institute's primary mission is to "enhance understanding of the processes of creating economic wealth and prosperity sharing. Clearly, this technology transfer process is at its heart. We want to not only tell you what we know, we want to know more ourselves."

Sullivan referred to commercialization as the core to the entire commercialization process, "...because we create industry, take discovery, and get it to the market. It then creates wealth and prosperity sharing – and we want to increase the likelihood of teaching you how to succeed in these areas as well as being successful at doing that ourselves."

### **Focus on the Faculty**

Sullivan then introduced Professor Timothy W. Ruefli, Management Science and Information Systems Department, UT-Austin Business School. In addition to his professorship at the Business School, Ruefli is an IC<sup>2</sup> Institute Fellow and Frank C. Erwin Endowed Centennial Professor.

According to Ruefli, his primary responsibility is to support the educational partnership between UT-Austin and DSMC by coordinating faculty for the program, and promoting a rapport between students and faculty that fosters a thriving learning environment.

Welcoming the assembled students, Ruefli said, "This degree program is designed for working professionals... We expect you will learn a lot from each other as part of the learning experience. We're bringing together a diverse group of people with various experiences, and we promote interaction."

Ruefli went on to say that the overriding focus of the course will be on science and technology as a key element of organizational competitive strategy. According to Ruefli, "We see science and technology commercialization as keys for organizations to reinvent themselves, as the basis for technology entrepreneurship, and as the engine that drives the social and cultural enrichment resulting from economic wealth and prosperity sharing. The ability to get things off the shelf and into the market is the key to competition, and rapid innovation is becoming the key to survival."

### Masters Program Structure

Ruefli promised the students a 12-month program that will be an intense, perhaps painful experience. The Institute will administer the program with a Friday/Saturday schedule, designed to let students work regular hours and still continue their education. He also spoke of communication skills and team building, two important tools integrated into the curricula. Speaking of the types of material covered in the program, Ruefli gave a brief review of the course material:

- What is the technology transfer and commercialization process?
- What are the stages of commercialization and why are they critical?
- How are innovation and creativity stimulating?
- How do we create scientists with entrepreneurial minds?
- How do we get scientists in the lab to work with people who can integrate things into the market?
- How can technology markets be identified and defined?
- What is the process of assessment, and how can capital expertise be

## DR. ROBERT S. SULLIVAN

Director, IC<sup>2</sup> Institute  
The University of Texas at Austin

**D**r. Robert S. Sullivan became director of the IC<sup>2</sup> Institute at The University of Texas at Austin on June 1, 1995. He has been an IC<sup>2</sup> Fellow since 1987 and is now the IC<sup>2</sup> Harry H. Ransom Centennial Fellow. He also serves as a member of the faculty of the UT-Austin Graduate School of Business and holds the J. Marion West Chair for Constructive Capitalism.

Sullivan was dean of the Graduate School of Industrial Administration (GSIA) at Carnegie Mellon University (CMU) from 1991-95 and is an adjunct professor in the Information Technology Center in the CMU School of Computer Science.

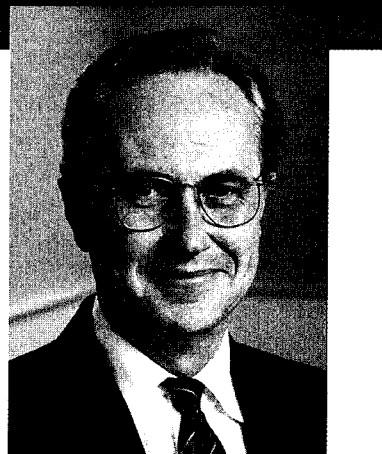
Under his leadership, the ranking of GSIA among business schools rose significantly. He led GSIA through complete reengineering of the school's educational and research programs. This complex effort included the application of advanced technology in the field of finance, a focus on increasing manufacturing productivity, and the creation of experimental and distance learning. The reengineering effort also encompassed development of one-of-a-kind innovative degree programs forged by combining GSIA's own resources with other Carnegie Mellon departments and those of other universities.

His administration stressed global educational interactions, the application of technology to the GSIA learning experience, "just-in-time learning," entrepreneurship, and the commercialization of new technologies.

From 1976 to 1991, Dr. Sullivan was on the faculty at The University of Texas at Austin, where he was Joe B. Cook Professor of Management and associate dean for research and academic affairs in the Graduate School of Business. He served as codirector of the Center for Technology Venturing, director of the Bureau of Business Research, and associate director of the Manufacturing Systems Engineering Program in the College of Engineering.

Sullivan was the first professor in the Management Department to win both the business school's undergraduate and graduate awards for teaching excellence. He was also involved in the design of the Manufacturing Systems Engineering Program and was a lead faculty member in the design of the Systems Management MBA program, which was funded with a \$2.7 million grant from the IBM corporation.

Sullivan's research interests center on manufacturing systems management and project



management. In particular, his research has focused on network simulation, implementation strategies for computer integrated manufacturing, and job scheduling and sequencing.

His publications have appeared in such journals as *Management Science*, *Operations Research*, *The International Journal of Production Research*, *Naval Research Logistics Quarterly*, and *Annals of Operations Research*. He has written two books with colleagues: *Service Operations Management* (McGraw-Hill, 1982) and *Quantitative Systems for Business* (Prentice-Hall, 1986), accompanied by a software product of the same name, which has appeared in a number of versions since the first publication.

Sullivan is a member of the editorial boards of two academic journals: *Interfaces* and the *Journal of Manufacturing and Operations Management*. He has served as chairman of The Institute for Management Sciences (TIMS) College on Production and Operations Management, chairman of the Special Interest Group in Manufacturing Management of the Operations Research Society of America (ORSA), and chairman of the review panel for the Design and Computer Integrated Manufacturing Program of the National Science Foundation. He is a member of the Task Force on Business School Education Committee of INFORMS (merger of TIMS and ORSA), a member of the Advisory Board of the Business School of the Adolfo Ibanez University (Chile), and 1996 president of the Greater Austin Quality Council.

His professional affiliations include the American Institute for Decision Sciences, the Institute for Management Sciences, and the Operations Management Association.

A graduate of Boston College in mathematics, Sullivan holds a master's degree in production management and quantitative methods from Cornell University and a doctorate in operations management from Pennsylvania State University.

accessed and applied to the commercialization process?

- How do we define the metrics of performance and assess risk?
- How do state and federal governments support R&D and commercialization? What's likely to happen? How can we capitalize on this?
- What is the impact of the legal system and intellectual property rights?
- What constraints are placed on commercialization?
- What do you have to know to make commercialization successful?
- How can you apply the commercialization process as a competitive weapon?

### Potential Career Paths and Course Instructors

Referring to the career paths available to those with the Science and Technol-

ogy Commercialization Degree, Ruefli stated, "We don't have a specific narrow channel that we're aiming at. We're talking about managers or directors of labs or technology divisions; leaders of technology-based companies; and companies working with Department of Defense, Department of Energy, and the federal labs. We're aiming at consultants holding local, state, and national positions with industry consortia. We're also looking at science and technology entrepreneurs themselves and technology venture capitalists."

Ruefli assured the students that UT-Austin had assembled an exceptional group of faculty to teach the courses. The instructors were selected for their knowledge, eminent qualifications to teach the subject matter, and skill in

working with people. He noted that Kozmetsky, co-founder of the C<sup>2</sup> Institute, will also be involved.

### Wrap-up

Concluding his remarks, Ruefli said that the classes are small enough that instructors can accommodate a reasonable amount of individual attention and focus. He then opened a student question-and-answer session, followed by registration and a tour of the Defense Systems Management College library, Management Deliberation Center, Learning Resource Center, and classrooms.

**Editor's Note:** For further information, prospective students should call 1-800-218-6782 or E-Mail: exec.ms@icc.utexas.edu.

## ARGENTINE DEFENSE ATTACHE VISITS DSMC

**O**n 18 January, 1996, we welcomed Lt. Gen. Carlos Zabala, Argentine Defense Attaché, to the Defense Systems Management College (DSMC). Zabala's visit was precipitated by Secretary of Defense William J. Perry's creation of the Argentine-U.S. Defense Bilateral Group in November of 1994 with the goal of cementing the close relations that have developed between Argentina and the United States since the 1990 Gulf War, in which Argentina participated. Argentina is in the process of restructuring its defense policy making apparatus, which includes, but is not limited to, the Ministry of Defense. They have identified an urgent need for trained civilian defense experts. This was the primary focus of Zabala's visit. They are interested in sending students to DSMC as well as having DSMC send instructors to Argentina to reach a larger audience at lower cost. This issue is likely to be central in the second meeting of all the Ministers of Defense of the Southern Hemisphere scheduled for October in Argentina. Perry hosted the first meeting, and will attend the second.

**Editor's Note:** LeBoeuf, whose native language is Spanish, acted as official interpreter throughout the visit.



Lt. GEN. CARLOS ZABALA, ARGENTINE DEFENSE ATTACHE, A REPRESENTATIVE FROM THE OFFICE OF INTERNATIONAL SECURITY AFFAIRS, AND MEMBERS OF THE COLLEGE STAFF REVIEW COURSE MATERIALS DURING THE ATTACHE'S ORIENTATION VISIT TO DSMC ON JANUARY 18, 1996. PICTURED FROM LEFT: LT. COL. BEAUCHAMP, AIDE TO LT. GEN. ZABALA; COL. WILLIAM E. KNIGHT, U.S. ARMY, DEAN OF COLLEGE ADMINISTRATION AND SERVICES, DSMC; LT. GEN. CARLOS ZABALA, ARGENTINE DEFENSE ATTACHE; PROFESSOR GIBSON LEBOEUF, HOLDER OF NAVY CHAIR, DSMC EXECUTIVE INSTITUTE; DR. FRED RUIZ-RAMON, INTERNATIONAL SECURITY AFFAIRS, INTER-AMERICAN REGION.

## FROM THE COMMANDANT

Greetings again. It's good to talk to you again after what I trust was a great Holiday Season for all of you. I always say in this column that your DSMC is busy. Well, that continues to be the case. Since I last spoke to you, we have conducted our first full Advanced Program Management Course (APMC), terminated it in the 11th week due to the November government shutdown, graded the resulting homework assignments, and graduated over 400 of the 420 APMC students.

We have weathered snow storms and additional government shutdowns due to weather, started the second APMC (APMC 96-1), graduated our first PMSC (Program Managers Survival Course for ACAT III PMs), hosted a number of outside conferences, and hosted the Argentine Attaché. We have visited a number of senior service acquisition field commands/commanders, industry association leaders, and visited with many of you in an effort to stay tuned to your needs.

From our travels and discussions, I have summarized the following: demand is very high for many of our courses, particularly the Intermediate Systems Acquisition Course (ISAC) and APMC. The demand outstrips our capacity to meet, not only in terms of classroom, but instructors and Defense Acquisition University funding. There is an increasing demand for the APMC to be taught on-site as well as in correspondence or seminar format. There is a growing need to provide continuing education (CE) for the professional acquisition workforce.

DSMC is committed to meeting your needs. As such, we have begun a review of our integrated PMC courses – Fundamentals of Systems Acquisition Management (FSAM), ISAC, APMC –

to determine how we can increase our capability to meet your needs. Alternatives which may allow increased capacity that we are currently reviewing include on-site, correspondence, Internet, tele-classroom, etc. FSAM will soon prototype in an alternative form. I am hopeful we will be able to prototype an Internet tele-classroom presentation in an upcoming ISAC. We will prototype an interaction CD contracting course in the near future.

*Bottom-line:* We hear you, and we're going to do all we can to meet your needs, both in terms of course availability as well as the quality of each course, which you can always expect to be maintained at the highest level.

As I always say, these are exciting times. I'm happy that you see us as the center of excellence for acquisition management. And I want to assure you we will continue to work hard to keep earning your faith and trust in us. Until we meet again.

—Brig. Gen. Claude M. Bolton, Jr., USAF  
Commandant

